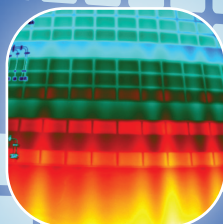# NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

Software Catalog

2014

From the rudimentary but effective Apollo Guidance and Navigation System that landed the first humans on the lunar landscape to the 500,000 lines of code used to put the Mars Curiosity Rover on the surface of the Red Planet, software has always been at the core of NASA's mission successes.

When NASA develops this software, the Agency is also mindful that the code may have uses beyond the original mission. In fact, it's another one of NASA's missions to ensure that the technologies it creates for aeronautics and space missions—including software—are turned into new products and processes that benefit the lives of ordinary Americans and the U.S. economy. It is through this process of technology transfer that NASA maximizes the benefit of the Nation's investment in cutting-edge research and development.

The technologies featured in this catalog represent NASA's best solutions to a wide array of complex problems, and they are on offer here to the public for use. They cover project management systems, design tools, data handling, and image processing, as well as solutions for life support functions, aeronautics, structural analysis, and robotic and autonomous systems.

A long line of such successful technology transfer has made us confident that these solutions, while originally conceived to solve NASA's challenges, may also prove useful in solving challenges faced by others.

Over the past 5 years, NASA has shared more than 5,000 pieces of code and has a vibrant infrastructure of dedicated software release professionals at the ready to assist with the smooth and simple process of transferring code from Agency applications to industry.

As you review the products featured in the Software Catalog, perhaps you will find that NASA has developed a solution that is applicable to one of your own design challenges and decide to acquire or license it. If so, you will be helping us fulfill our mission of bringing NASA technology down to Earth.

Daniel Lockney
Technology Transfer Program Executive
Office of the Chief Technologist
NASA Headquarters

Using the Catalog

Offering an extensive portfolio of software products for a wide variety of technical applications, the NASA Software Catalog is organized into fifteen broad subject matter categories. The codes within each category are listed alphabetically. All catalog entries include the software title, the product ID number (known internally as the NASA case number), a short description, and the software's specified release type. Some software descriptions contain links to additional information or downloading options.

Each code listed in the catalog is available at no cost and has been evaluated for access requirements and restrictions:

- **General Public Release**—For codes with a broad release and no nondisclosure or export control restrictions

- **Open Source Release**—For collaborative efforts in which programmers improve upon codes originally developed by NASA and share the changes

- **U.S. Release Only**—For codes available to U.S. persons only, with no further transfer of the software allowed without the prior written approval of NASA

- **U.S. and Foreign Release**—For codes that are available to U.S. persons and (under special circumstances) persons outside of the U.S.

- **U.S. Government Purpose Release**—For codes that are to be used on behalf of the U.S. government

    - **Project Release**—For use under a contract, grant, or agreement

    - **Interagency Release**—For use by U.S. government agencies

    - **NASA Release**—For use only by NASA personnel and contractors

The NASA Software Catalog is continually updated. Please visit the NASA Technology Transfer Portal for the latest updates and revisions: technology.nasa.gov

Points of Contact

Each NASA Center has a Software Release Authority (SRA) representative ready to assist you with your software requests. Contact information is provided below:

Case Number	NASA Center	Contact Information
ARC-XXXXX	Ames Research Center	kim.l.chrestenson@nasa.gov
DRC-XXX-XXX	Armstrong Flight Research Center	earl.s.adams@nasa.gov
GSC-XXXXX	Goddard Space Flight Center	techtransfer@gsfc.nasa.gov
HQN-XXXXX	NASA Headquarters	stanley.artis-1@nasa.gov
JPL-XXXXX	Jet Propulsion Laboratory	brian.a.morrison@nasa.gov
KSC-XXXXX	Kennedy Space Center	roger.h.liang@nasa.gov
LAR-XXXXX	Langley Research Center	stuart.pendleton@nasa.gov
LEW-XXXXX	Glenn Research Center	jason.m.hanna@nasa.gov
MFS-XXXXX	Marshall Space Flight Center	msfc-sra-team@mail.nasa.gov
MSC-XXXXX	Johnson Space Center	jsc-techtran@mail.nasa.gov
SSC-XXXXX	Stennis Space Center	gigi.h.savona@nasa.gov

How to Request Software

The software release process involves only a few simple steps:

1. Identify the software code's case number (which appears on the same line as the software's title)

2. Use the table above to determine which NASA Center and SRA representative correspond to the software's case number prefix

3. Send an email to the appropriate Center SRA to request a software release form; in the body of your email, provide your name, contact information, and a short description (one or two sentences) of how you intend to utilize the software. The SRA will review your request form, verify that you meet the software's access requirements, and prepare a Software Usage Agreement for your signature and email or FAX it to you.

4. Sign the Software Usage Agreement and return it to the SRA

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Business Systems and Project Management

Acquisitions

Business Processes

Property Management

Risk Management

Scheduling

Action Item System
GSC-14482-1

The Action Item System is a Web-based tool that allows users to send and respond to actions from any Internet connection. The software centralizes and organizes all action items for a particular organization or project, enables assignees of an action to respond multiple times and/or forward the action to a more appropriate assignee, notifies individuals via email when an action is nearing or has surpassed its due date, allows initiators to attach files to an action, and allows assignees of an action to return files through the system. Setting up individual user accounts is easily completed through a Web interface.

U.S. Government Purpose Release

Astronomer's Proposal Tool (APT)
GSC-14946-1

A vision of the Space Telescope Science Institute, the Astronomer's Proposal Tool (APT) makes the proposal preparation process more intuitive and observatory operations less cumbersome. The software leverages off state-of-the-art technologies and provides modern user support tools.

General Public Release

Audit Tracking Information System (ATIS)
MFS-33070-1

The Audit Tracking Information System (ATIS) provides the audit manager and team with the tools/information needed to perform, manage, and close an audit. All affected personnel have centralized, timely access to system tools and data. The process is automated to the maximum extent practical, improving efficiency and providing information on all aspects of any particular audit.

U.S. Government Purpose Release

Automated Animation Creation Tool (ANIMATOR)
MFS-31690-1

The Automated Animation Creation Tool (ANIMATOR) is a software program developed as a two- and three-dimensional tool for creating Motion Picture Experts Group (MPEG) animation files.

U.S. Government Purpose Release (Project)

Automated Change Processing (ACP)
MSC-25493-1

The Automated Change Processing (ACP) software supports configuration change management. It is a Documentum-based client/server application that uses Oracle and a database management system (DBMS) for data storage. Functionality includes change initiation, screening, assessment, disposition and closure, as well as support for configuration control board activities.

U.S. Government Purpose Release

Automated Document Request System (ADRS)
MSC-25643-1

ADRS tracks document requests. The software has been used by the Logistics Technical Data Center at the NASA Shuttle Logistics Depot (NSLD). In the system's utilization here, users could be anyone with entry to the USA Human Resources System and access to the USA Intranet, including NASA, Boeing North America (BNA), and subcontractor personnel.

U.S. Government Purpose Release

Automated Evaluation System (AES)
GSC-15477-1

Used during the source evaluation board (SEB) process, the Automated Evaluation System (AES) is a database that assists users with organizing evaluations and generating final reports.

U.S. Government Purpose Release

Automated Management Document Control System (AMDCS)
MSC-25548-1

The Automated Management Document Control System (AMDCS) tracks the storage location of archived documents. The software has been used for processing all work authorization documentation associated with the Space Shuttle's ground support equipment, external tank, solid rocket boosters, and even the documentation associated with the vehicle itself. Related data such as photographs can also be tracked in AMDCS.

U.S. Government Purpose Release

Automated Release Processing (ARP)   MSC-25494-1

The Automated Release Processing (ARP) application supports the release of engineering documentation. It is a Documentum-based client/server application that uses an Oracle database and a database management system (DBMS) for data storage.
U.S. Government Purpose Release

Automated Support Requirements System (ASRS)   MSC-25495-1

The Automated Support Requirements System (ASRS) has been used to manage the support requirements of the program-wide Universal Documentation System (UDS). The software has been used to transmit technical support requirements/responses between NASA and Department of Defense (DOD) centers and agencies that have supported the launch, landing, flight, and payload needs of the Space Shuttle.
U.S. Government Purpose Release

Board Support Package for the RTEMS Real-Time Operating System
on the Motorola MCF5307C3 Processor Board (RTEMS Coldfire BSP)   GSC-14987-1

This software package enables the RTEMS Real-Time Operating System (see <http://www.rtems.com>) to run on the Motorola MCF5307C3 evaluation processor board. The package contains processor startup code, device drivers, and interfaces to RTEMS.
U.S. Government Purpose Release

Can I Buy   GSC-14870-1

The Can I Buy tool automates processes used to request and approve procurements. The software allows registered users to create, submit, un-submit, and delete purchase requests. Different capabilities are provided depending on a person's "role." Privileged roles include branch head, assistant branch head, secretary, resource analyst, credit card specialist, and tool administrator. Email is the medium of communication in the system.
U.S. Release Only

Change Request (CR) Pipeline   MSC-25032-1

CR Pipeline can be used as a program-wide tool to capture, plan, and prioritize change requests and evaluations.
U.S. Government Purpose Release

Chemical Material Tracking (CHEM)   MSC-25496-1

CHEM has been used to track the issue and return of chemical bottle quantities and chemical lot quantities.
U.S. Government Purpose Release

Cicero Configuration Management System   GSC-16583-1

Cicero is a generic, customizable, Web-based database application designed to facilitate the document change process. In addition to providing a Web site from which approved personnel may download current versions of base-lined documentation for their projects, Cicero supports the creation and management of configuration change requests (CCRs). Through Cicero, configured documents may be modified in a controlled fashion.
U.S. Government Purpose Release

Cipher Lock Tracking (CLT)   MSC-25568-1

The Cipher Lock Tracking (CLT) tool allows physical/technical security personnel to track the numerous cipher locks under their responsibility.
U.S. Government Purpose Release

Client/Server Automated Work Control System (CEV-AWCS)　MSC-25549-1

CEV-AWCS tracks the workflow of thermal protection, from work authorization through manufacture and repair.
U.S. Government Purpose Release

Closed-Loop Accounting Management System (CLAMS)　KSC-12289

The Closed-Loop Accounting Management System (CLAMS) is a Web-based application used to disseminate critical processing information to the workforce and provide feedback to management that the information was received. The tool allows management at any level to accurately track any critical information, and it also serves as a historical database of what information was sent out, to whom, and when it was received. CLAMS has potential application as shareware to companies using Cold Fusion Server software.
U.S. Release Only

Columbia Reconstruction Database System (CRDS)　MSC-25497-1

CRDS is a custom application specific to the cataloging of Space Shuttle Columbia debris.
U.S. Government Purpose Release

Configuration Auditing Tool (CAT)　GSC-15309-1

CAT enables the generation of configuration information and the creation of baseline configurable items. Automated and remote interrogation scripts provide configuration information in the form of "as-built" reports. Specific CAT features include a change control tool, a baseline management tool, an auditing tool, a Web baseline information system tool, an automated code preparation and delivery tool, and process daemons.
U.S. Government Purpose Release

Crane Ops Database (CraneOps)　MSC-25600-1

CraneOps performs equipment tracking for cranes, generators, water pumps, power doors, overhead cranes, Vehicle Assembly Building (VAB) platforms, hoists, and other heavy site equipment.
U.S. Government Purpose Release

Crane Ops Database Upgrades (CraneOps_2K)　MSC-25569-1

This application ties into the CraneOps database and provides more equipment tracking option information. See the description for CraneOps Database.
U.S. Government Purpose Release

Cribmaster　MSC-25550-1

Cribmaster is a commercial off-the-shelf (COTS) package used to track and dispense tools from material service center tool cribs.
U.S. Government Purpose Release

Customer Service System (CSS)　MSC-25045-1

The Customer Service System (CSS) is an interactive Web-based service request system that will allow customers to request products and services online. The tool helps to minimize the manual steps required and reduce the turnaround time needed to approve and process service requests. CSS provides for authorization of funding, management approval, review of network access, and final authorization for implementation.
U.S. Government Purpose Release

Customer Survey　MFS-33069-1

Customer Survey is a generic survey tool that affords the ability to construct, email, and manage surveys. The overhead cost of Customer Survey is extremely low, as the tool exists on a virtual server.
U.S. Government Purpose Release

Data Service Provider Cost Estimation Tool and Comparables Database   GSC-14905-1

The Data Service Provider Cost Estimation Tool (CET) and Comparables Database (CDB) package provides NASA's Earth Science Enterprise (ESE) the ability to make lifecycle cost estimates for the implementation and operation of the data service providers that are required to support its science and applications programs. The Data Service Provider CET and CDB package employs a cost-estimation-by-analogy approach. For more information on the package, please visit: <http://opensource.gsfc.nasa.gov/projects/CET/index.php>

Open Source Release

Document Accounting and Control System (DACS)   MSC-25551-1

The Document Accounting and Control System (DACS) tracks the physical location of work authorization documents online.

U.S. Government Purpose Release

Documentum Florida (Documentum-FL)   MSC-25552-1

Documentum Florida is a document management system.

U.S. Government Purpose Release

DRD (CD)   MSC-25571-1

DRD (CD) records and indexes Checkout, Control & Monitoring Subsystem (CCMS) data and provides a retrieval interface for individual FDs, TCIDs, and FD information. The tool runs on all SDC hosts except for the FEP process, which requires the FREDS host.

U.S. Government Purpose Release

Electronic Document System (EDS)   MSC-25514-1

The Electronic Document System (EDS) is a Web-based application that provides support for local or geographically dispersed users. It is available through common Web browsers (provided the user has a NASA domain account) and requires no installation.

U.S. Government Purpose Release

Electronic Guest Operations (EGO)   MSC-25083-1

Electronic Guest Operations (EGO) has been used as an all-encompassing electronic guest management system for tracking guest invitations/RSVPs to Space Shuttle launches, landings, and receptions. The tool serves as a single application that will maintain guest and mission information, run standard reports, email guests, produce mailing labels, and export data. Via the Internet, invited guests can access EGO Web pages from all over the world to register their attendance intentions, access relevant mission data, and update their contact information. After guest registration, administrative support personnel have used EGO to maintain guest-seating assignments, send email communications, maintain attendance to special receptions, and gather security information for foreign guests. EGO replaces a very paper-intensive process, saves a significant amount in postage costs, and reduces error-prone data entry. The tool has been built with flexibility and customization in mind. Its initial scope was broadened to also serve as the login for people invited to view an International Space Station Friends and Family Web site created by Wyle Life Sciences. The Constellation program also used EGO to invite guests to attend the Pad Abort (PA-1) test flight in 2010.

U.S. Government Purpose Release

Electronic Position Description System (ePDS)   MSC-24585-1

The Electronic Position Description System (ePDS) tracks reappointments, promotions, reassignments, demotions, and transfers to new positions. An intuitive Web-based system, ePDS is used for creating, maintaining, and storing NASA's official federal civil service position descriptions (PDs). It dynamically determines format, factor levels, and default text or values based upon user responses to prompts, drop-down selections, and queries. The ePDS includes embedded business rules and process flows to align user input with federal classification rules, standards, and policies to create a legal document that justifies salaries and occupational designations. The system provides for automated surveillance for data quality and integrity, improving consistency and accuracy.
U.S. Government Purpose Release

Electronic Program Online Risk Tool (ePORT)   MFS-32693-1

The Electronic Project Online Risk Tool (ePORT) is a Web-based risk management tool. The software provides a common framework to capture and manage risks.
U.S. Government Purpose Release

Electronic Timecard System   KSC-12051

The Electronic Timecard System can be utilized by any business or organization wishing to streamline its payroll department procedures. The automated system minimizes the consumption of paper and eliminates the need for weekly pick-up and delivery of time sheets. The tool also simplifies the daily recording of time worked by employees, and it allows employees to "sign" their "timecards" electronically at the end of each week. Supervisors can review an employee's electronic timecards daily and sign them electronically.
U.S. Release Only

Engineering Knowledge Base (EKB)   MSC-25573-1

The Engineering Knowledge Base (EKB) provides storage for informal departmental and system records. Most areas in the EKB can be accessible to all personnel. Other areas can contain restricted/company confidential material and be administered by data owners.
U.S. Government Purpose Release

Financial Management Tool (FMT)   MSC-25521-1

The Financial Management Tool (FMT) was originally developed for use in project management and has been upgraded into a tool for both project and financial management. FMT facilitates lower-level project planning and the execution of division budgets, and it allows for a centralized location of real-time data. Project managers can develop a baseline plan for the costs of full-time equivalents (FTEs) and work-year equivalents (WYEs) in the tool; track expenditures; and provide monthly updates to project estimates at completion (EAC). Budget analysts can track budget changes, funding drops, and real-time expenditures. The tool's audit capability ensures that internal budget books accurately reflect business warehouse commitments. Cost and FTE actuals are loaded from the business warehouse for monthly variance reporting during reviews to customers. The tool permits special division reporting to management and also includes custom, ad-hoc reporting capabilities.
U.S. Government Purpose Release

Fingerprint Cards   MSC-25574-1

Security personnel used this application in order to print employee information onto fingerprint cards.
U.S. Government Purpose Release

Fixed Ladder Inspection (FLI) Database   MSC-25575-1

The FLI Database has been used to maintain the inspections results of fixed ladders. The tool provides for the evaluation of risk assessments and affords the ability to identify ladders that should be upgraded.
U.S. Government Purpose Release

Florida Refrigerant Online Service Tracking   MSC-25498-1

This system allows users to meet state and federal regulatory requirements of tracking Freon.
U.S. Government Purpose Release

Goal Performance Evaluation System   KSC-12036

The Goal Performance Evaluation System (GPES) is an innovative interactive software application that implements, validates, and evaluates an organization's performance by the achievements of its employees. The tool has been used for strategic planning, employee performance management, and center-wide communication. The system is Web-based and uses a relational database to host information.
U.S. Release Only

Goddard Mission Services Evolution Center (GMSEC)
Alert Notification System Router (ANSR), Version 3.9   GSC-15895-1

ANSR is a paging/notification software tool that supports automation within a Mission Operations Center (MOC) utilizing the GMSEC architecture. ANSR is primarily used to notify satellite operators of error conditions, including an unexpected telemetry value. ANSR relies on a reasoning/logic engine and can alert operators through pages, emails, or texts.
U.S. Government Purpose Release

Goddard Opportunities Bulletin Board System (GOBBS) Web Application   GSC-15514-1

GOBBS is a Web-based application that enables managers and supervisors to advertise special employment opportunities to a broader audience. Employees can be grouped organizationally (e.g., all of Division 1) or by skills/experience bases (e.g., engineering, administrative, etc.). Parties interested in a given employment announcement can apply online with minimal effort. GOBBS does not replace Competitive Placement Plan vacancy announcements that require competition-through-merit promotion procedures.
U.S. Government Purpose Release

Google Custom Administration Reporting (gTracker)   MSC-25405-1

The gTracker tool is used to track and report statistics associated with searches. The application allows authorized users to view a report of the number of user clicks per search, click totals, and top search terms for a specified date range.
U.S. Government Purpose Release

Google Sift   MSC-25403-1

This NASA Online Directives Information System (NODIS) application interfaces with the Johnson Space Center (JSC) search appliance to display a listing of all documents derived from NASA Policy Directives (NPDs), NASA Procedural Requirements (NPRs), and NASA memos that contain the term "center director." The tool allows the user to click on a document link and view a listing of all directives contained in the selected document and also view detailed information for each directive. The application provides an Excel report of "accepted" directives.
U.S. Government Purpose Release

Google Usage Capture   MSC-25404-1

This tool was developed in order to track the individual behaviors of users conducting searches.
U.S. Government Purpose Release

Grants Document-Generation System (GDGS)   GSC-15187-1

The GDGS software enables the generation of official grants documents for distribution to appropriate parties. GDGS is written in Cold Fusion and resides on an Oracle database. The tool includes access security and the Locator and Information Services Tracking (LIST) system.
U.S. Government Purpose Release

Hazard Database (Hazard) — MSC-25553-1

The Hazard Database (Hazard) custom application is used to enter data for hazard reports per NASA hazard analysis guidelines.
U.S. Government Purpose Release

Hazardous Material Review Records (HMRR) — MSC-25554-1

The Hazardous Material Review Records (HMRR) custom application provides an automated method to review and approve the purchase of chemical products.
U.S. Government Purpose Release

HazTracker — MSC-25576-1

The HazTracker database is used to supply the base support contractor of hazardous, controlled, or universal waste with the required information/records associated with container pickup.
U.S. Government Purpose Release

Heavy Equipment Database (HE_CO_Data_2K) — MSC-25577-1

This tool provides an asset management capability for the Crane Ops database, and it includes equipment tracking options information for heavy equipment shops.
U.S. Government Purpose Release

Heavy Equipment Database (HE_Data_2K) — MSC-25578-1

This tool tracks heavy equipment fleets for a launch and recovery system ground support system (L&RS GSS).
U.S. Government Purpose Release

Hubble Space Telescope (HST) Guide Star Catalog — GSC-15569-1

This software tracks the distribution of the Hubble Space Telescope (HST) Guide Star Catalog.
U.S. Government Purpose Release

InfoCases — MSC-25579-1

This application supported the United Space Alliance (USA) industrial security investigators in the opening, processing, closure, and statistical tracking of investigations.
U.S. Government Purpose Release

InSpec Automated Review System — GSC-15175-1

InSpec is an automated review system that utilizes the C# language and the .NET framework on the front end and a SQL server on the back end. The tool allows a team to collect all product review comments/input, including any correlating software and documentation. InSpec permits a more efficient review process by enabling a team to focus on important issues rather than inconsequential details.
U.S. Government Purpose Release

Integrated Configuration Data Management (ICDM) Application — MSC-25085-1

ICDM was developed to be the official integrated configuration data management (CDM) tool for the Constellation program and its associated projects. The Web-accessible application provides a single, integrated user interface for the change management, versioning, and reporting of Constellation program documents, change requests, and products. Additionally, ICDM includes commonly used canned reports, ad hoc reporting, and some basic configuration status accounting capabilities. While ICDM can support "document-centric" configuration and data management practices, it was built considering the movement toward a "data-centric" philosophy. A document-centric system requires humans to extract data and "massage" it to make it useful in another system; a "data-centric" system permits the management of data entities at a lower level of granularity than a document. A data-centric architecture: allows for structures

and searchable, computer-interpretable data sets; enables more automated, flexible reporting and data aggregation for analysis across business areas; permits data access without having to connect to multiple systems; focuses and streamlines a change evaluation process; and allows for the reuse of data across multiple applications without impacting data quality.
U.S. Government Purpose Release

Integrated Design Capability (IDC) Tool for Management, Administration, and Planning (TMAP)   GSC-14836-1

The Integrated Design Capability (IDC) Tool for Management, Administration, and Planning (TMAP) tracks IDC customers/studies for managers of the Instrument Synthesis and Analysis Laboratory (ISAL) and the Integrated Mission Design Center (IMDC). The software can track all aspects of design study administration, as well as all interfaces and communications with IDC management, customers, engineers, and support team.
U.S. Government Purpose

Intranet-Based Learning (IBL)   MSC-25581-1

The Intranet-Based Learning (IBL) system allows employees to access training courses via an Intranet.
U.S. Government Purpose Release

James Webb Space Telescope (JWST) Next-Generation Integrated Network (NGIN)   GSC-14860-1

The Next-Generation Integrated Network (NGIN) is a suite of project management tools deployed on a private Web site and used by James Webb Space Telescope (JWST) project personnel worldwide. NGIN utilizes centralized databases and standardized IT management and security methods, replacing the need for standalone applications for library, configuration, and risk management.
U.S. Government Purpose Release

Johnson Space Center (JSC) Action-Tracking System (JATS)   MSC-25659-1

JATS is an action-tracking tool that allows for attachments, multiple assignees, dependent and cloned actions, the export control filtering of attachments, and the delegation of responsibilities to another user. JATS utilizes "grouping" and "roles" so that the system can be tailored to fit an organization's specific needs. Additional modules have been added to allow correspondence management/tracking and Space Station Review Board action tracking. The legal office action-tracking module can isolate legal documents from the general document repository. JATS also has a full ad hoc search and reporting capability. Reporting features allow hierarchical organizational managers to track and report on the actions of subordinates. The system uses NASA-approved authentication methods and is 508 compliant.
U.S. Government Purpose Release

Johnson Space Center (JSC) Engineering Services iOS App   MSC-25458-1

This iOS mobile application highlights some of the innovative technologies developed at NASA JSC and the technical facilities and laboratories used to evaluate these technologies.
U.S. Government Purpose Release

LES Miscellaneous Parts Database (LES_Misc)   MSC-25582-1

This database was used to track smaller miscellaneous support parts for the LES shop.
U.S. Government Purpose Release

LES Oil Analysis Database (LES_OA)   MSC-25583-1

This database was used to track and maintain the useful life records for the oil used in LES and technical shops.
U.S. Government Purpose Release

LES Parts Database (LES_P)　　　　　　　　　　　　　　　　　　　MSC-25584-1

This database was used to track inventory, new parts, and materials for the LES shop.
U.S. Government Purpose Release

LES Refurbed Parts Database (LES_Refurb)　　　　　　　　　　　　MSC-25580-1

This database was used to track and update parts sent to the LES shop for refurbishment.
U.S. Government Purpose Release

LRU Database (LRU)　　　　　　　　　　　　　　　　　　　　　　MSC-25556-1

The LRU database is a custom application used to generate, record, track, and maintain LRU drawings.
U.S. Government Purpose Release

Marshall Space Flight Center (MSFC)
Engineering Knowledge Management Capability　　　　　　　　　MFS-32844-1

The MSFC Engineering Knowledge Management (ME KM) system applies leading-edge knowledge management technologies and organizational strategies to promote engineering competency and growth.
U.S. Government Purpose Release

Move Director Site (MDS)　　　　　　　　　　　　　　　　　　　MSC-25587-1

MDS primarily tracks flight hardware moves, providing a place for training coordinators and move directors to share information.
U.S. Government Purpose Release

Multiple Activity Data Sharing (MADS) Tool　　　　　　　　　　　MSC-25488-1

MADS is a collaboration of business support functions hosted on a centralized database system. The tool automates and records daily maintenance work, calculates metrics, tracks and studies trends, and compares and refines estimation approaches for future planning.
U.S. Government Purpose Release

NASA Aircraft Management Information System (NAMIS)　　　　　MSC-24723-1

The NASA Aircraft Management Information System (NAMIS) is an enterprise resource planning/mission support software suite designed from the ground up to meet both the mission support requirements and the business management requirements of JSC's Aircraft Operations Division (AOD). The system features tools and processes that: 1) eliminate the risk of conducting flight operations in aircraft with overdue inspections, in aircraft with grounding discrepancies, and in aircraft not properly configured for the mission; 2) provide continuous and positive control of all assets including materials, parts, and equipment that exceed a customer-defined value; and 3) reduce material costs and labor hours. NAMIS includes the data, information, and metrics required to support flight operations management and business decisions, as well as the data required by other systems and external components to support consistent and accurate financial reporting and asset accounting.
U.S. Government Purpose Release

NASA Cares　　　　　　　　　　　　　　　　　　　　　　　　　MSC-24866-1

The NASA Cares application provides a secure way to track NASA employee contact and status information following major events.
U.S. Government Purpose Release

NASA Form 1018 Electronic Submittal System (NESS)   GSC-14738-1

The NASA Form 1018 Electronic Submittal System is an automated tool designed to assist in the collection, maintenance, analysis, and distribution of NASA's industrial property information. The purpose of this Web application is to provide contractors with a method for reporting financial information related to property held in their custody.

U.S. Government Purpose Release

NASA Hazard Management System (HMS)   MSC-25694-1

The Web-based, access-controlled NASA Hazard Management System (HMS) provides a centralized repository for hazards regardless of origin and offers the ability to report and manage real-time hazards and controls. The primary mechanism for identifying and documenting hazardous conditions within HMS lies in the creation and management of two types of analysis documents: Hazard Analyses (HAs) and Job Hazard Analyses (JHAs). While these two document types offer different approaches for hazard identification and classification, they both offer controls for mitigating hazards. HMS provides a framework within which HA and JHA documents are created, reviewed, and approved. Once approved, the hazardous conditions identified within a document are considered active. More important, the controls associated with the hazards are then also considered active. HMS includes the mechanisms required to evaluate hazards using standard Risk Assessment Code (RAC) scoring.

General Public Release

NASA Performance Evaluation Profile (PEP)   MSC-25681-1

NASA's Performance Evaluation Profile (PEP) program provides a PC-based method for conducting standardized self-assessments of operational and system safety program processes. PEP features software applications and a modified Management Oversight and Risk Tree (MORT) logic diagram to analyze both the strengths and weaknesses of occupational and system safety programs.

General Public Release

NASA Root Cause Analysis Tool (RCAT)   HQN-11316-1

The NASA Root Cause Analysis Tool (RCAT) has been designed to facilitate the analysis of anomalies, close calls, and accidents and also identify the appropriate corrective actions to prevent recurrence. The software provides an analyst with a quick, easy-to-use, accurate, and repeatable method to perform and document root cause analysis, identify corrective actions, perform trending analysis, and generate usable data for probabilistic risk assessment. All possible causes of accidents—hardware, software, the environment, weather, natural phenomena, external events, human error—can be incorporated into the timeline and fault/causal factor trees. The software features an intuitive logic diagramming capability and uses standard terminology, definitions, and symbols.

General Public Release

Open-Ticket Request System (OTRS) Software Improvements and Enhancements   GSC-14981-1

OTRS is an open-source ticket request system (also well known as a trouble ticket or help desk system) with features to manage customer inquiries typically initiated via telephone calls and emails. The system provides IT support for the ticketing, tracking, and resolution of inbound inquiries.

U.S. Government Purpose Release

PeopleSoft Financial Data Quality Management (FDM)
Integrated Supplier Quality Management System (iQUALITY)   MSC-25555-1

The iQUALITY tool integrates and standardizes supplier quality management across an enterprise.

U.S. Government Purpose Release

Performance Improvement Notice (PIN) Tool — MSC-25541-1

The Performance Improvement Notice (PIN) Tool enables improvements (suggestions) to be entered and dispositioned via a programmed workflow. Each PIN is accepted or rejected with rationale. If a PIN is accepted, stakeholders are assigned by organization and then roles and responsibilities are defined so that an action plan can be approved and completed.
U.S. Government Purpose Release

Pressure Systems Reporting Tool (PSRT) — MFS-32923-1

The Pressure Systems Reporting Tool (PSRT) is an application designed and implemented to support the risk-based management of pressure systems and vessels.
U.S. Release Only

Procedure Integrated Development Environment (PRIDE) — MSC-25358-1

The Procedure Integrated Development Environment (PRIDE) is an authoring tool that allows engineers to create standard operating procedures in a fast and efficient manner.
U.S. Government Purpose Release

Program Model Number Engineering Per Facility Group (PMN/Engineering DB) — MSC-25595-1

This database extracts all engineering released per a program model number (PMN), uploads it, and then allows for a review and validation.
U.S. Government Purpose Release

Project Integrated Tracking System (PITS) — MSC-25594-1

The Project Integrated Tracking System (PITS) provides for the subcontract management of costs and the tracking of estimates, contract changes, engineering changes, and contract documentation.
U.S. Government Release Purpose

Project Risk Information Management Exchange (PRIMX) — GSC-14980-1

The Project Risk Information Management Exchange (PRIMX) provides a centralized source for continuous risk management (CRM) information by combining risk identification, analysis, planning, tracking, control, and communication into a single comprehensive environment that meets the requirements of NASA Procedures and Guidelines (NPG) 7120.5B and 8000.4. The software permits project personnel access to current CRM documentation, gives the status of risk activities, and identifies emerging risks that may influence the formulation development of a given project/program. PRIMX is free-standing network software (not an add-on program) that runs on any Windows platform.
U.S. Government Purpose Release

Rapidly Deployable Software Process Simulation Model — GSC-14869-1

The Rapidly Deployable Software Process Simulation Model provides a fast and cost-effective methodology for predicting project performance, assessing the costs and benefits of process alternatives and enabling managers to make better decisions when allocating scarce project resources.
U.S. Government Purpose Release

Safety Clears Online Log (SCOL) — MSC-25560-1

The Safety Clears Online Log is a Web-based custom application that tracks hazardous and operational clears that are created around hazardous areas.
U.S. Government Purpose Release

Safety/Risk Assessment Database (Safety RA) — MSC-25559-1

The Safety/Risk Assessment Database (Safety RA) is a custom application used to maintain and search completed risk assessments.
U.S. Government Purpose Release

Scenario Scheduler Timeline Execution Application Suite — GSC-16066-1

Scenario Scheduler is a Java software application that is integrated with the Goddard Mission Services Evolution Center (GMSEC) application program interface for use in Mission Operations Centers. The application stores activity lists or "scenarios" for execution in a timeline- and/or event-driven nature. The application is set up via a flat file schedule of activities to perform. Scenario Scheduler is redundant and both execution nodes work together in a prime/backup mode with automatic failover.
U.S. Government Purpose Release

Schedule and Cost Risk Assessment Module (SCRAM) — MFS-32752-1

The Schedule and Cost Risk Assessment Module (SCRAM) is a companion program to Microsoft Project, adding Monte Carlo simulation, probabilistic branching, and risk and trend reporting functions.
U.S. Government Purpose Release (Project)

Schedule Test and Assessment Tools (STAT) Suite — MFS-32602-1

The Schedule Test and Assessment Tool (STAT) Suite is a Microsoft Project add-in created to assist the scheduling community with the identification, measurement, and rating of key credibility indicators contained within a project or program Integrated Master Schedule (IMS).
U.S. Release Only

Shipping Foam Designer Software — MSC-25515-1

The Shipping Foam Designer Software is an easy-to-use design tool that allows the user to select the proper type and dimensions of shock-attenuating packing foam. A simple graphical user interface is provided. The software was developed in response to a large number of documented cases of critical hardware failures that resulted from drops during shipment.
General Public

Shuttle Processing Electronic Archival and Retrieval System (SPEARS) — MSC-25562-1

SPEARS is a document scanning system utilizing DataCap TaskMaster 2000 C/S.
U.S. Government Purpose Release

Sign Language Interpreter Scheduling System (SLISS) — GSC-14452-1

The Sign Language Interpreter Scheduling System (SLISS) provides a tool for requesting the support of sign language interpreters at NASA-sponsored events. Designated/assigned system administrators have authority to approve or deny requests for services. The system also enables a user to monitor the availability of interpreters.
U.S. Government Purpose Release

Space Operations Learning Center (SOLC) — GSC-16063-1

The Space Operations Learning Center (SOLC) is a highly graphical Web-based learning environment that employs analytical and visualization tools to develop its contents. Currently five SOLC modules have been developed: Space Communication, Flight Dynamics, Information Processing, Mission Operations, and Kids Zone. Each of the first four modules contains three components: Flight Training is a sequence of animation clips combined with text and narration to present learning material at an appropriate age level; Flight License is a short quiz to test and reinforce the knowledge gained from Flight Training; and the Fly It! simulation program allows students to perform a hands-on flight assignment. Kids Zone, which has been designed for younger students, consists of multiple mini-modules. For more information, please visit: <http://solc.gsfc.nasa.gov>
U.S. Government Purpose Release

Space Telescope Grants Management System
GSC-14740-1

The Space Telescope Grants Management System (STGMS) is an integrated software package that allows the Space Telescope Science Institute (STScI) to electronically administer grants related to the Hubble Space Telescope; the tool also gives grantee institutions and investigators simultaneous electronic access to information and documents connected to those same grants. The flexible, multiplatform system reduces the cost of administering Hubble General Observer (GO), Archival Researcher (AR), Educational Outreach (EO), Initiative to Develop Education through Astronomy and Space Science (IDEAS), and Hubble Fellow (HF) grants.
U.S. Government Purpose Release

Stamp Control Program Database (SCPD)
MSC-25561-1

The Stamp Control Program Database (SCPD) provides closed-loop tracking through the use of a flexible Web-based tool. A stamp coordinator captures an item in an electronic format, institutes new stamps, and assigns stamps to certain individuals. Functions have been incorporated that permit the stamp collector to review the current status of a stamp in the system.
U.S. Government Purpose Release

Stennis Space Center (SSC) Site Status Mobile Application
SSC-00424

This application provides SSC civil servants, contractors, and tenants the ability to view the Center's weather radar and current site status bulletin from a mobile device. The application also alerts users via push notification when a new site status is posted.
General Public Release

Supervisory Survey—Supervisory Feedback Tool
GSC-15534-1

This application consists of an online survey that collects feedback from employees regarding their supervisors. Employees can anonymously review their immediate supervisor, a supervisor above their own immediate supervisor, or a matrixed supervisor. Feedback topic questions cover human resource management, communication, diversity and equal opportunity, and teamwork. The reports function allows supervisors to compare current feedback to feedback from previous surveys.
U.S. Government Purpose Release

Survey Editor and Player Software
GSC-15070-1

The Survey Editor and Player Software provides an automatic way to obtain survey information from stand-alone kiosks in museums, schools, and other public venues. The software can play on multiple machines without the need for individual Macromedia projector licenses for each machine; the Micromedia source code is not released. Survey Editor requires the user to install QuickTime 6 (available from Apple.com).
U.S. Government Purpose Release

System Change Request Processing (SCRP)
MSC-25499-1

SCRP enables the user to track change requests made against IM platforms and software. The software also provides lifecycle tracking of these change requests.
U.S. Government Purpose Release

Task Order Management System (TOMS)
GSC-14702-1

A cost-effective e-Business solution, the Task Order Management System (TOMS) allows for the paperless processing and tracking of virtually any type of government task order contract. The tool provides a standardized user interface into a centralized task order database. TOMS will track a task order from its initiation, through the approval cycle, and out to the vendor and back. The approval cycle function works through email notifications and can be tailored easily to meet the needs of any organization. Completely Web-based, TOMS allows for real-time access and will provide an up-to-the-minute status of each task order.
U.S. Government Purpose Release

Taxonomy Services for Google Search Appliance   MSC-25406-1

The Taxonomy Services for Google were written for the purposes of injecting taxonomy metadata into the Google Search Appliance and utilizing it.
U.S. Government Purpose Release

TicTacToe Editor and Player Software   GSC-15071-1

An educational knowledge competition game, TicTacToe is a compiled, multiplatform Macromedia projector that is a standalone tool. The software can play on multiple machines without the need for individual Macromedia projector licenses for each machine; the Micromedia source code is not released. TicTacToe requires the user to install QuickTime 6 (available from Apple.com).
U.S. Government Purpose Release

Time-and-Materials Technical Order (TMTO)   MSC-25598-1

The TMTO software enables the cost management data collection of labor, materials, and other costs associated with a time-and-materials technical order contract.
U.S. Government Purpose Release

Tool to Facilitate Capability Maturity Model Integration
(CMMI) Appraisals   GSC-14782-1

In addition to providing Capability Maturity Model Integration (CMMI) orientation for the development team, this facilitation tool can reduce the time and energy expended in preparation, collaboration, and execution of CMMI appraisals. The software helps an organization to achieve the appropriate levels of CMMI necessary to reduce costs and keep missions on track.
U.S. Government Purpose Release

Tools for Security Planning and Assessment of Risk (TSPAR)   MSC-25492-1

The TSPAR software tool provides computer security officials the functionality to create, review, and analyze IT security risk assessment matrices and risk configuration documents.
U.S. Government Purpose Release

Training and Certification Electronic Reporting System (TRACERS)   MSC-24756-1

The Web-based Training Records and Certification Electronic Reporting System (TRACERS) manages employee training records. Employees can view job training requirements, career development obligations, and listings of prerequisites needed for specific positions. Training coordinators and managers can view and/or edit position requirements and the career development records for employees in all of the departments they supervise. The system improves upon a previous package that required data entry to be completed by program administrators.
U.S. Government Purpose Release

Transition and Retirement Information Technology
System Tracking Tool (TRIT)   MSC-25470-1

The TRIT system allows for the tracking of IT assets and offers custom disposition applications.
U.S. Government Purpose Release

Virtual System Design Environment (VSDE) Portal Framework   GSC-14724-1

The Virtual System Design Environment (VSDE) system is a Web-based portal framework that offers a knowledge repository and a collaborative environment to serve science and engineering teams with product development throughout a product's lifecycle. The VSDE framework generates a one-stop shop for product design, providing users real-time access to product development data, engineering and management tools, and relevant design specifications and resources.
U.S. Government Purpose Release

Visual Observation Layout Tool (VOLT)　　　　　　　　　　　　　　　GSC-14510-1

VOLT's visual tools help to automate and plan for coordinated observations among multiple observatories, including the Hubble Space Telescope (HST), the Chandra X-Ray Observatory (Chandra or AXAF), the X-Ray Timing Explorer (XTE), and the Far-Ultraviolet Spectroscopic Explorer (FUSE). Primary users of the software would be scientific observers and investigators and their planning staffs. VOLT's planning coordination tools run in a standalone environment, but they are also capable of operating in an integrated environment (e.g., in the Scientist's Expert Assistant (SEA) or in the Astronomer's Proposal Tool (APT)).
General Public Release

Warnings Database (Warnings)　　　　　　　　　　　　　　　　　　MSC-25564-1

The Warnings Database (Warnings) is a custom application used to develop and maintain a list of hazard warnings for work authorization documents (WADs).
U.S. Government Purpose Release

Web Program Compliance Assurance and Status System (WebPCASS)　　　MSC-25642-1

The WebPCASS project migrated existing PCASS datasets to a Web-enabled environment by utilizing the Space Program Operations Contract (SPOC) Data Warehouse Advanced Data Acquisition and Management (ADAM) system. Providing access to a composite of warehoused data, WebPCASS was required by, and supported the objectives of, the System Integrity Assurance Program (SIAP).
U.S. Government Purpose Release

Web-Based Help Management System　　　　　　　　　　　　　　　GSC-14998-1

Easily deployable, the Web-Based Help Management system provides a simple and effective way of adding extra functionality to a Web site. The system allows non-programmer users to locate "help" using a variety of methods and also permits administrators to easily customize and manage help applications.
U.S. Government Purpose Release

What's Up at Wallops (Android App)　　　　　　　　　　　　　　　GSC-16683-1

What's Up at Wallops enables individuals to experience launches and flight projects as spectators. This mobile application provides simple, intuitive, dynamic tools that help to answer such questions as: When is the next launch? What is its purpose? What can I expect to see? Where should I look? How can I follow along with the countdown? For more information, visit: <https://play.google.com/store/apps/details?id=gov.nasa.wff.whatsupatwallops&hl=en>
U.S. Release Only

2

Data Servers Processing and Handling

Algorithms

Data Management

Routers

Servers

Storage

ADROIT Tool for Wirelessly Distributing Multimedia Data to Remote Devices   MSC-24512-1

ADROIT is an innovative software solution that allows complex real-time multimedia data streams to be viewed as information on remote devices. The middleware solution permits access to data at any time using XML and wireless transmissions to Web-enabled handheld devices (e.g., personal data assistants, laptops, netbooks, and smart phones). Because it decreases the number of personnel required to be in a control center, ADROIT reduces operations costs.

U.S. Government Purpose Release

Analog Input Data Acquisition Software   KSC-13203

With the easy-to-use Analog Input Data Acquisition Software, a user can set up a system for monitoring up to five analog input channels. The software requires LabVIEW runtime engine 8.0 (a free download from ni.com) to run the executable.

U.S. Release Only

Application for Managing Accounts and Surveys for Association Chapters   MSC-24705-1

A Web-based management application, this tool facilitates networking and communications for an association's members and other interested parties. The innovation allows site administrators to create surveys, view user responses in bar graph form, and send bulk emails to all members. An administrator console permits authorized personnel to manage user accounts, membership dues, surveys, and events.

U.S. Release Only

Application Program Interface (API) for the Orion Aerodynamics Database (Cap Aero)   MSC-24819-1

Programmed in C, CAP Aero was developed to provide software developers an easily implemented, fully self-contained method for accessing the Crew Exploration Vehicle's Aerodynamic Database. No special functions (file read/write, table lookup, etc.) are required on the host system other than those included with a standard ANSI C installation. CAP Aero reads files of aero-data tables formatted as specified in the document, "Aerotab Data File Format." The aerodynamic coefficients and forces calculated by the program follow the equations cited in the document, "Formulation of the Orion Aerodynamic Database."

U.S. Government Purpose Release

Application Research Toolbox (ART)   SSC-00181

Application Research Toolbox (ART) algorithms and models allow a user to perform a suite of simulations and statistical trade studies on remote sensing systems. ART can synthesize coarser spatial resolution image sets from high spatial resolution image sets and can also synthesize multispectral image products from hyperspectral image products.

General Public Release

Athena Software Platform   MFS-33036-1

The Athena platform is designed to be a single-point source for acquiring, assessing, archiving, and disseminating scientific and technical information. The platform ensures successful performance, increases safety, and saves resources.

U.S. Government Purpose Release

Ballast: Balancing Load Across Systems   ARC-16443-1

Ballast is a tool for balancing user load across Secure Shell Handler (SSH) servers. The system includes a load-balancing client, a lightweight data server, scripts for collecting system load, and scripts for analyzing user behavior. Because Ballast is invoked as part of the SSH login process, it has access to user names. This capability, which is not available in traditional approaches, enables Ballast to perform user-specific load balancing. In addition, Ballast is easy to install, induces near-zero overhead, and has fault-tolerant features in its architectures that will eliminate single points of failure. The software can be downloaded at: <http://people.nas.nasa.gov/~kolano/projects/ballast.html>

Open Source

BugView
ARC-16790-1

Bugview is a Web-based graphical user interface (GUI) service that provides software developers and analysts the ability to configure and execute off-the-shelf static code analysis tools and securely manage imported code releases and analysis results. The service: 1) presents a single interface from which multiple static code analysis tools can be configured and executed; 2) offers a means to automate consistent periodic analysis of each code release; 3) affords the capability to track code changes and identified code issues through progressive build releases: and 4) provides tools for identifying and rejecting false-positive results.
Open Source

C3
ARC-16731-1

Built in Python/Django and very customizable, C3 acts as a platform through which one can easily launch collaborative Web sites. Plug-ins can be enabled to extend functionality.
U.S. Government Purpose Release

CAPTools-based Automatic Parallelizer Using OpenMP (CAPO)
ARC-14487-1

CAPO analyzes a Fortran program and inserts OpenMP directives into the code to improve its performance on a parallel machine. The tool relies on accurate inter-procedural data-dependence information currently provided by CAPTools, which was developed at the University of Greenwich. The CAPO software can be downloaded at: <http://people.nas.nasa.gov/~hjin/CAPO/>
Open Source

Clickworkers: Distributed Human Scientific Analysis
ARC-15318-1

The Clickworkers system consists of a Web server and client-side scripts that execute on a browser. The technology allows thousands of distributed volunteer participants ("clickworkers") to create a science database by visually examining an image, classifying its features (e.g., craters), and/or measuring its properties (e.g., size, location, etc.). Each clickworker is presented with a small piece of a problem at one time (e.g., a single image or a small subset of a map). A consensus may be computed by clustering the responses of multiple clickworkers who have analyzed the same piece of a problem; the consensus can be weighted based on the quality of an individual clickworker's previous work.
U.S. and Foreign Release (Academic)

CODE—A Software Framework For Control and Observation In Distributed Environments
ARC-14672-1

CODE is a framework for the control and observation of resources, services, and applications. The technology supports the secure and scalable transmission of observed information to other programs, and it enables the secure execution of actions on remote computer systems. CODE is modular, can be extended easily, and can be downloaded at: <http://www.nas.nasa.gov/Resources/Software/Open-Source/code.html>
Open Source

Code for Embedding the Python-Scripting Language Within Stata Statistical Software
MSC-25491-1

This code facilitates the usage of the Python scripting language within Stata statistical software. Its core functionality comes from a C plug-in to Stata that can be used to run Python scripts or interactive Python sessions. A few Python files and .ado files (files in Stata's scripting language) are provided for extending basic functionality.
U.S. Government Purpose Release

Code for Testing User-Written Commands in Stata Statistical Software
MSC-25670-1

This NASA-developed tool helps users of Stata statistical software test their own Stata code. Two different programs make testing Stata commands easier, faster, and more reliable.
U.S. Government Purpose Release

2. Data Servers Processing and Handling

Code for Working with .dta Format Files in the Python Programming Language   MSC-25658-1

This NASA code helps users work with and manipulate .dta format files in the Python programming language.
U.S. Government Purpose Release

Computational Fluid Dynamics (CFD) Extraction Tool for TecPlot from Data Parallel Line Relaxations (DPLR) Solutions   MSC-24982-1

This innovation is a TecPlot macro computer program that processes data from Data Parallel Line Relaxations (DPLR) solutions in TecPlot format. The tool converts SI units into British units. The macro can also process surface solutions.
U.S. Government Purpose Release

Coordinated Data Analysis Workshop Web (CDAWeb)   GSC-14292-1

The CDAWeb software and the CDAWeb service built on this software have been developed and continue to be enhanced and maintained by the Space Physics Data Facility. The technology has supported NASA/ Office of Space Science programs dealing with the connections between the Sun and the Earth. CDAWeb software is essentially a set of Interactive Data Language (IDL) scripts that act as the engine of the system. Please visit: <http://cdaweb.gsfc.nasa.gov/cdaweb/istp_public/>
Open Source

CriticalThreads—A Low-Level Parallelization Architecture for Critical Applications   MSC-25719-1

CriticalThreads is a multi-threading architecture library utilizing POSIX threads. The technology distributes parallel sections of code to multiple critical-application CPUs. CriticalThreads trades some of the smart task-scheduling and resource friendliness of OpenMP and Intel's Thread Building Blocks (TBB) in order to achieve the smallest parallelization overhead possible.
U.S. Government Purpose Release

Data Center and Network Configuration Tracking with Visio Macros   MSC-25645-1

This NASA software consists of VBA-developed macros that attach to Microsoft Visio templates and drawings to add composition, inheritance, and aggregation functionality.
U.S. Government Purpose Release

Distributed System Integrated Labs Communications Adapter (DSILCA)   GSC-15846-1

Providing interoperability between Constellation systems at the hardline and baseband external interfaces, DSILCA is a communications adapter that converts non-C3I-compliant data and interfaces into C3I-compliant data and interfaces.
U.S. Government Purpose Release

Distributed System Integrated Labs Communications Adapter Set (DSIL CAS)   GSC-15501-1

DSIL CAS affords Constellation's Distributed System Integration Laboratories the ability to connect geographically separated labs. The tool provides interface conversions from subscriber identification modules (SIMs) and offers a command, control, communications and intelligence (C3I) compatibility test bed.
U.S. Government Purpose Release

Distributed System Integrated Labs Interface User (DSILIU)   GSC-15847-1

DSILIU provides interface conversion to Ethernet to allow nationwide connectivity over the NASA Integrated Services Network (NISN) or other high-bandwidth interagency network.
U.S. Government Purpose Release

Domain Name System (DNS) Graphical User Interface (GUI) Software   MSC-25624-1

Combining a client graphical user interface with a server process, this NASA software provides the capability for updating a system's DNS settings from an operator's console.
U.S. Government Purpose Release

Dyper: Dynamic Perimeter Enforcement   ARC-16444-1

Dyper protects a site from unauthorized network flows. The tool offers dynamic perimeter enforcement by providing a general-purpose mechanism for maintaining least-privilege network security policies while still supporting the full utilization of multiport protocols. Dyper requires no changes to software or practices outside of the perimeter and only minimal changes inside. The software can be downloaded at: <http://people. nas.nasa.gov/~kolano/projects/dyper.html>
Open Source

Earth Observing System (EOS) Clearing House (ECHO)   GSC-14726-1

The Earth Observing System Clearing House (ECHO) affords the earth science community more flexibility in accessing and sharing data and services. As a metadata clearinghouse, ECHO supports iterative query data access. As a service broker, ECHO decentralizes data-manipulation tools and supports the interoperability of distributed functions. For more information, please visit: <http://ti.arc.nasa.gov/opensource/projects/echo/>
Open Source

Earth Observing System (EOS) Data Gateway (EDG)   GSC-14938-1

The Earth Observing System Data Gateway (EDG) provides the earth science community with a single interface that will search for data granules from distributed data archives. The innovation enables users to explore, discover, and order available data from geographically distributed providers. For more information, please visit: <http://opensource.gsfc.nasa.gov/projects/edg/index.php#software>
Open Source

ECS Metadata Validator   GSC-15018-1

The ECS tool validates an XML document based on the Bulk Metadata Generator Tool (BMGT) granule or collection schema. The software will generate reports that list all invalid elements.
U.S. Government Purpose Release

Engineering Dynamic On-board Ubiquitous Graphics for Exploration (EDGE)   MSC-24663-1

EDGE combines key elements from graphics software tools developed for Space Shuttle and International Space Station (ISS) programs and adapts them for integration with other engineering simulations and facilities. The tool allows drop-in integration with the NASA Trick Simulation Environment and provides a fusion of 3D graphics and simulation outputs.
U.S. Government Purpose Release

Engineering Units Generator (EUGEN)   SSC-00151-1

EUGEN consists of three computer programs that preprocess digitized sensor output during rocket-engine tests at Stennis Space Center (SSC). The technology creates individual processed data files (one file per transducer per test run), converting raw voltage to meaningful measurements such as pressure or temperature. EUGEN applies exclusively to the SSC E test stand.
General Public Release

File Exchange Interface (FEI 5)   JPL-40075

The File Exchange Interface (FEI) service offers secure file transaction, storage, transportation, and management services. The tool is implemented with the latest Java technologies for maximum portability and supports a 64-bit file system for very large file transfers over secure socket connections. While database-driven for file transactions and user access management, FEI offers an interactive client software suite for managing administration and general use.
U.S. Government Purpose Release (Project)

Fortran Unit Testing Framework (fUnit v1.0)   LAR-17081-1

The fUnit software provides a framework for unit-testing Fortran 90, 95, and 2003 code.
Open Source

HDF-EOS2 and HDF-EOS5 Compatibility Library   GSC-15008-1

This software library provides uniform access to HDF-EOS2 and HDF-EOS5 files through one set of application program interface (API) calls. Without the library, programs would have to be written twice to cover both HDF-EOS2 and HDF-EOS5 files. <http://opensource.gsfc.nasa.gov/projects/HDF-EOS2/index.php>
Open Source

HDF-EOS5 Validator   GSC-15015-1

This software allows generators of HDF-EOS data products to encode product requirement specifications in XML. The tool will then mechanically check product files against those requirements. For more information, please visit: <http://opensource.gsfc.nasa.gov/projects/Validator/index.php>
Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) Data Extractor (HEEX)   GSC-15009-1

The Hierarchical Data Format Earth Observing System (HDF-EOS) Data Extractor (HEEX) is a tool that enables users to extract HDF-EOS data to binary or ASCII data formats in HTML or XML index. The software can be used for both HDF-EOS2 and HDF-EOS5, and it automatically recognizes the two formats.
Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) Metadata Updater (HEMU)   GSC-15010-1

HDF-EOS Metadata Updater (HEMU) enables users to modify metadata inside an HDF-EOS file (either HDF-EOS2 and HDF-EOS5). The tool can be used to extract metadata from a dataset to a text file that can then be modified with any text editor; replace metadata with text from an external file; or update metadata with text from an external file. For more information, please visit: <http://opensource.gsfc.nasa.gov/projects/hemu/index.php>
Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) Web Server   GSC-15011-1

This shell script chains together existing data usability group tools to: extract ODL metadata from an HDF-EOS file; convert the metadata to XML; reformat the XML into HTML; publish the HTML and the original HDF-EOS file to a Web server and an OPeNDAP server; and reformat the XML and submit it to the Earth Observing System Clearing House (ECHO). For more information, please visit: <http://opensource.gsfc.nasa.gov/projects/heserve/index.php>
Open Source

Hierarchical Data Format Earth Observing System (HDF-EOS) XML Document-Type Definitions and Schemas

GSC-15016-1

An XML standard has been developed for the HDF-EOS5 file format using document-type definitions and schemas. Users can transform HDF5 files into XML format and vice versa. For more information, please visit: <http://opensource.gsfc.nasa.gov/projects/XML_DTD_Schemas/index.php>
Open Source

Identity Management Service for SensorWebs

GSC-16268-1

The Identity Management Service allows users to delegate their authority for executing workflows. The tool creates a single sign-on script that enables the execution of multiple actions in different domains, thereby linking various sensors and their data processing together in a cohesive manner while traversing secure boundaries.
U.S. Government Purpose Release

IND 2.1—Creation and Manipulation of Decision Trees from Data

ARC-14529-1

Decision trees are commonly used in artificial intelligence and statistical pattern recognition. A tree is "grown" from data using a recursive-partitioning algorithm. IND re-implements parts of existing standard prediction algorithms, offers experimental control suites, and also introduces new, more sophisticated methods for growing decision trees.
Open Source

Information Sharing Protocol Logger (ISPLOGR)

MSC-25610-1

Written in C, this software program provides the capability of recording Information Sharing Protocol (ISP) data into a Source Independent Telemetry Format (SITF) file. ISPLOGR uses command-line arguments to specify output file names and other required parameters. Once the SITF file is defined, it can be used as input to other available ISP software for data playback.
U.S. Government Purpose Release

Information Sharing Protocol VCR (ISPVCR)

MSC-25608-1

Written in Tcl/tk, the ISPVCR software program provides the capability to record and play back Information Sharing Protocol (ISP) data via Source Independent Telemetry Format (SITF) files. A graphical user interface starts and stops recording and playback and also specifies output file names.
U.S. Government Purpose Release

Innovative eXtensible Information Modeler (XIM) for Data Modeling

MSC-24575-1

This flexible Web service application facilitates data modeling in business cases in which requirements are incomplete or are constantly evolving. Key elements of the software include: a schema-less database for modeling flexibility, a core service-layer architecture for business rule and database encapsulation; an XIM application library; a custom model-view controller framework; and a Flex® software development tool. Since the XIM core is domain-independent, each application is an embodiment of XIM with its own business rules and additions to the core service layer.
U.S. Government Purpose Release

Interactive Graphical SCADA System (IGSS) XML Adaptor for the James Webb Space Telescope (JWST)

GSC-15422-1

Built for the James Webb Space Telescope (JWSP), this adaptor is a major component of the Interactive Graphical SCADA System (IGSS). The technology allows a database to be translated from XML into a variety of output products, including other XML files, ASCII files, and both HTML and/or Microsoft Access formats.
U.S. Government Purpose Release

Interface Software for Nivis ISA100.11a Gateway
MSC-25409-1
....

This software implements an interface with the Nivis ISA100.11a gateway using the ISA100.11a Gateway Service Access Point (GSAP).
U.S. Government Purpose Release

Jitter Controller Software
MSC-24814-1
....

Developed for the Constellation program, Jitter Controller Software helps manage the relationships between phase jitter crest factor, frequency jitter crest factor, and cycle-to-cycle crest factor. Written in LabVIEW, the code calls Agilent drivers to write to generator hardware. Although not well documented and originally intended to be disposable, the software has been reused.
U.S. Government Purpose Release

K9Client
ARC-15154-1
....

Complementing the K9 Rover Control Software (ARC-14587), K9Client is a small set of libraries and applications built on top of ACE/TAO, a free Common Object Request Broker Architecture (CORBA) communications package. The tool allows programs in isolated software bases to communicate with a minimum of shared software using string-based commands and value requests.
General Public Release

Kameleon Software Suite—the Kameleon Converter
GSC-15440-1
....

Developed at the Community Coordinated Modeling Center (CCMC), the Kameleon Software Suite addresses the difficulty in analyzing and disseminating the varying output formats of space weather model data. Employing a comprehensive standardization methodology, Kameleon allows heterogeneous model output to be stored uniformly in a common science data format. The converted files contain both the original model output as well as additional metadata elements to create platform-independent and self-descriptive data files. Kameleon facilitates model data dissemination, data reuse, and code reuse.
U.S. Government Purpose Release

LACE Task Manager (LTM)
GSC-15154-1
....

LTM is a simple scheduler for commodity computing clusters. The software will also retain information about the number of jobs being submitted and how long a user must wait in a queue.
U.S. Government Purpose Release

Mercury Shopping Cart Interface (MSCI)
GSC-14940-1
....

MSCI affords access to a wide variety of interface components for the Earth Observing System Data and Information System Clearing House (ECHO). The tools are being made available for re-use in other client development efforts.
U.S. Government Purpose Release

Metadata Check
GSC-15012-1
....

Metadata Check is a command-line tool to check Earth Observing System (EOS) metadata with a metadata descriptor. For more information, please visit: <http://opensource.gsfc.nasa.gov/projects/metacheck/index.php>
Open Source

Method and Program Code for Improving Machine Efficiency in the Computation of Nearly Singular Integrals
MSC-25640-1
....

This innovation provides a method for improving machine efficiency in the computation of nearly singular integrals. The code has been applied to computational electromagnetics (CEM) problems and could have application to a variety of computational modeling disciplines.
U.S. Government Purpose Release

mREST Interface Specification and Software Package   MSC-25721-1

REST, or Representational State Transfer, is a term used to describe an architectural style for networked systems. mREST is an implementation of the REST architecture specific to the management and sharing of data in a system of logical system elements (LSEs). (An LSE is any definable object that provides data and can include either hardware or software components.) mREST provides a standard framework so that a system of disparate LSEs can be integrated easily to accomplish the goals of a complete system.
U.S. Government Purpose Release

Multi-threaded Copy Program (MCP)   ARC-16494-1

MCP is a high-performance file copy utility that achieves performance gains through parallelization. Multiple files and parts of single files are processed in parallel using multiple threads on multiple processors. The program employs the OpenMP and MPI programming models. For more information, please visit: <http://mutil.sourceforge.net>
Open Source

NASA Technology Transfer System (NTTS)
Search and Reporting Application Programming Interface   ARC-16697-1

The NASA Technology Transfer System (NTTS) Search and Reporting application programming interface (API) uses various logical operators to query well-structured Extensible Markup Language (XML) data. The algorithm is capable of providing search results maintaining one-to-many relationships, and it will perform set operations that include Union, Intersection, and Difference. Output can be retrieved in XML or comma-separated value (CSV) format. The interface will provide content search criteria within a context or scope, dynamically interpret operations based on data type, and perform set operations in combination with logical operations.
U.S. Government Purpose Release
This software is available for licensing.

NASA UNIX Tool Kit   KSC-12269 • KSC-12268 • KSC-12271

The NASA UNIX Tool Kit contains three components that all work together to form a single technology for UNIX administration: (1) Secure, Web-Based UNIX System Administration Tools (KSC-12269) ease the administration of a large, distributed UNIX system, providing a secure mechanism for creating, modifying, locking, and deleting users. (2) The second component of the software kit is the Client/Server to Create, Modify, and Query VERITAS File System Quotas on an NFS-Mounted File System with a Secure Web-Based Interface (KSC-12268). In this technology, the client (which exists on an internal secure platform with a secure interface) can be accessed from any authorized platform capable of running a Web browser. The server software exists on a UNIX platform configured with the VERITAS file system. (3) The Web-Based IP Address Tool (KSC-12271) provides an easy-to-use system for maintaining IP address information for a network of computers.
U.S. Release Only

Netmark eXtensible DataBase, Data Access and Retrieval Composition (XDB3-DARC)   ARC-16119-1B

This innovation will query using a suite of operators in the Netmark/XDB query language to retrieve elements based on the absolute value of tags in the XML source. In an earlier version of the software, element retrieval was based solely on "full-text" term searches of the tags and their values. For more information, please visit: <https://sourceforge.net/projects/darcxdb3/>
Open Source

Nivis ISA100.11a Radio Driver Software for TI Microcontroller   MSC-25408-1

Through a serial peripheral interface (SPI) port, this software allows a microcontroller to interact with a Nivis VN210 radio running an ISA100.11a stack.
U.S. Government Purpose Release

NodeMon—A Visualization Tool For Monitoring System Resource Utilization — ARC-15771-1

NodeMon allows distributed resource monitoring via a growler software infrastructure. The tool is tailored to the Altix architecture but is applicable to any Linux system. Individual modules will monitor CPU, memory, and numalink activity. NodeMon will compose large amounts of statistical information and display it through a single graphical window. Please visit the following URL to download the software: <http://ti.arc.nasa.gov/opensource/projects/nodemon/>

Open Source

Performance Logging Services (PLS) — KSC-12343

Working in real time and using very little memory and CPU, Performance Logging Services (PLS) is an innovative software-performance monitoring tool that tracks statistics on timing and buffer usage. To assist in troubleshooting, PLS will start or stop other software tools when performance requirements are out of specification. The technology has been used in the Checkout and Launch Control System on NASA's Space Shuttle program.

U.S. Release Only

Power User Interface (PUI) — GSC-14939-1

Developed in response to the unique needs of the earth science community, the Power User Interface (PUI) provides a quick, concise, streamlined mode for users to order data granules. Two versions of PUI are available: one is a Web-based middleware application and the other is a UNIX command-line mode client. Both implementations utilize PUI modules to perform order functions in conjunction with external systems. The command-line approach works with Earth Observing System Clearing House (ECHO) metadata and order-entry process services. The Web-based middleware works with ECHO as well as with the Mercury Shopping Cart, an open-source order-service component provided separately by the Oak Ridge National Laboratory (ORNL) through the Department of Energy (DOE).

U.S. Government Purpose Release

RAYGUN—A fast Generic Geometry Ray-Casting Tool — MSC-25668-1

RAYGUN performs a time-optimized ray cast against a generic geometry definition. A standalone utility, the tool includes a development library that can be used in other programs.

U.S. Government Purpose Release

Real-Time Software-Based H.264 Video Encoding — MSC-25717-1

As an alternative to restrictive and expensive hardware, this NASA-developed software can be used for graphics card capture and low-latency, H.264-encoded video to serve clients over various transport protocols.

U.S. Government Purpose Release

Regional Application Center Software (RODIN) — GSC-14368-1

The RODIN software can be used for end-to-end earth science imagery and spatial data capture, processing, storage, indexing, search, retrieval, and delivery. The system is scalable and extensible due to its agent-based message-passing architecture.

U.S. Government Purpose Release

Remote Memory Access Protocol Target Node — GSC-16467-1

This NASA technology provides SpaceWire design users with support for executing remote memory access protocol (RMAP) read and write commands. The target IP core is a VHDL description suitable for implementation in a field-programmable gate array (FPGA) or an application-specific integrated circuit (ASIC).

U.S. Government Purpose Release

Rocket Plume Spectroscopy Simulation for Hydrocarbon-Fueled Rocket Engines　　　**SSC-00281**

Enhancements and modifications to a code developed for plume spectral data analysis in 1994 have made the original computer program applicable to the Space Shuttle Maine Engine and the Diagnostic Test-bed Facility Thruster (DTFT). The new code can now handle the non-uniform wavelength intervals at which spectral computations are made.
U.S. Government Purpose Release

SDC DAP Data Retrieval Services (DSDRI)　　　**MSC-25572-1**

DSDRI is a set of common libraries and programs used by DAP applications to retrieve CCMS-recorded data.
U.S. Government Purpose Release

SDCSystem (SDCSystem (CS))　　　**MSC-25596-1**

Providing methods for controlling and monitoring software running on multiple hosts, this technology acts as a layer between a vendor's delivered operating system and locally developed applications and other system software.
U.S. Government Purpose Release

Semantic Text Mining and Annotation for Information Extraction and Trend Analysis Tool (STAT)　　　**MSC-24614-1**

The Semantic Trend Analysis Tool uses linguistic analysis software and an ontology to extract new dimensions in data records that contain natural language text fields. Text fields in problem report data records (e.g., discrepancy reports, problem reports, corrective-action reports, and software change reports) might contain information that is critical to finding trends and groupings of recurring problems. STAT overcomes problems with scoping by linking up meaningful phrases that could be separated by text (e.g., "not aligned" versus "not completely aligned"). STAT's use of hierarchical ontologies overcomes the limitations of data codes, which are flat, closed, and have small sets of values that are often difficult to interpret. The ontology organizes aerospace terminology in hierarchies of types of problems, properties, objects, and functions. The tool identifies and tags types of problems and equipment mentioned in text fields, thereby providing new data files for record keeping. These new data files support text mining and clustering, report generation, browsing, and search at various levels of abstraction.
U.S. Release Only

Shared Memory Framework for Distributed Processing of Models and Simulation on a Linux Host with Virtual Machines　　　**MFS-32970-1**

This NASA innovation implements distributed model processes with shared memory data exchange across virtually hosted operating systems.
U.S. Release Only

Simple, Scalable, Script-based Science Processing Archive (S4PA)　　　**GSC-15877-1**

Simple, Scalable, Script-based, Science Processing (S4P) Archive (S4PA) is a disk-based archiving system for remote sensing data. The tool can be used for new data transfer, data preprocessing, metadata generation, and data archival. Services provided include data access control, data subscription, metadata publication, and data recovery. All data are archived on readily available disk drives, with FTP and HTTP being the primary modes of data access. S4PA includes a graphical user interface for monitoring and re-configuring system operation. Please visit: <http://disc.sci.gsfc.nasa.gov/additional/techlab/s4pa>
Open Source

Simple Subset Wizard   GSC-16375-1

The Simple Subset Wizard (SSW) makes searching for granules easier. The tool unites the search function with various subsetters to deliver a single, simple, seamless process. SSW uses OpenSearch to query the Earth Observing System Clearing House (ECHO) for granules and then employs individual subset agents to submit requests.
U.S. Government Purpose Release

Software Suite to Support In-Flight Characterization of Remote Sensing Systems   SSC-00393

This software suite processes ground truth data sets efficiently and consistently so that they may be used for in-flight characterizations on a number of commercial remote sensing systems.
General Public Release

Spatial Resolution Verification Tool (SRVT)   SSC-00339

SRVT provides rapid determination of spatial resolution characteristics for remotely sensed aerial and satellite imagery. The technology finds uniform, high-contrast edges from urban scenes and uses these edges to determine standard estimators of spatial resolution. Algorithms have been validated against traditional techniques by using the IKONOS and QuickBird imagery of engineered edge targets.
General Public Release

STAMiNA   JPL-45213

Utilizing STAMiNA, a simulation tool for the Advanced Sensors Collaborative Technology Alliance Microsensor Network Architecture, users can define: (1) mission environment, including terrain features; (2) a sensed object set, including multiple threat objects; (3) sensor placements, their modalities, and their abilities to sense different object types; (4) threat object trajectories; (5) sensing and sensed data dissemination for information fusion; and (6) various network configurations and formations between sensors to examine the coupling of sensing and communication. With these features, STAMiNA provides an overall system-level performance of different sensor network architectures under different parametric conditions.
U.S. Government Purpose Release

Standard Autonomous File Server (SAFS)   GSC-14409-1

SAFS automatically manages the large data files that are the result of mission-specific data functions. The tool also permits timely customer access to these files without interfering with the assets involved in data acquisition and processing. SAFS operates as a standalone solution, monitoring itself and providing failover processing to enhance reliability. When multiple projects overlap, the system prioritizes file transfers by bandwidth sharing or transfer-interruption methods. Automated Web reporting offers a near-real-time status of system availability, file latency, and customer file distribution.
U.S. Government Purpose Release

State Chart Autocoder   JPL-47810

This NASA technology automatically generates code from UML/SysML state-machine models specified in the MagicDraw modeling tool. Input is saved as XML data files, and output is provided by the state-machine implementation code in C, C++, Python, or Promela. A test suite validates output products, and a test harness allows a developer to execute and animate a model with a graphical state-machine monitor. This monitor can run as either a standalone tool or as an Eclipse plug-in to MagicDraw.
U.S. Government Purpose Release

Storeplex, Version 1.0   SSC-00156-1

Storeplex provides quick, reliable data extraction from tape recorders. The technology offers batch-file operation, employs either a command-line or graphical user interface, and affords the ability to control playback time to within one-hundredth of a second of the time specified by the user.
General Public Release

Switch Management and Control (SMaC) Centralized Network Device Management Software
MSC-25733-1

The Switch Management and Control (SMaC) application's framework enables one or more clients to configure network devices through a centralized server. Clients send XML-formatted requests to the server, which performs actions on a remote device and then sends an XML-formatted response back to the client once an action has been completed.
U.S. Government Purpose Release

Synchronization, Archival, Validation, and IP Exchange (Save)
ARC-16445-1

Save is a high-availability framework that manages IP addresses shared between multiple servers. It also monitors the health of those servers to determine which one should be actively servicing requests at any given time. Synchronization mechanisms allow configuration files to be kept consistent between systems and also allow commands to be executed across all servers of a particular type. Archival mechanisms provide automatic version control of configuration files to aid in recovery in case of errant configuration. Visit the following URL to download the software: <http://people.nas.nasa.gov/~kolano/projects/save.html>
Open Source

Synchronous Communications Bus 1553
GSC-16265-1

This application programming interface acts as a synchronous communications mechanism to pass data, allowing both sides of a transaction to communicate over the bus.
U.S. Government Purpose Release

System for Authoring and Integrating Domain Models Plans and Procedures
MSC-25669-1

This software framework enables subject matter experts to develop their own domain models interactively. The technology provides interfaces to external Web sources, and it includes ontological reasoners that keep model data consistent internally. Output files, written in the Web Ontology Language (OWL), are readable by planner and procedure executive computer applications.
U.S. Government Purpose Release

Time Series Product Tool (TSPT)
SSC-00261

Developed in MATLAB, this custom-designed software tool creates and displays superior quality Normalized Difference Vegetation Index (NDVI) images that can be used in the rapid regional surveillance of crops, forests, and other vegetative surfaces.
U.S. Government Purpose Release

Unified Incident Command and Decision Support (UICDS)
GSC-15756-1

For the National Information Sharing System (NIMS) and the National Response Framework (NRF), UICDS middleware offers file sharing and decision support among the many commercial and government incident-management technologies used across the country to prevent, respond to, and recover from natural and technological events and acts of terrorism.
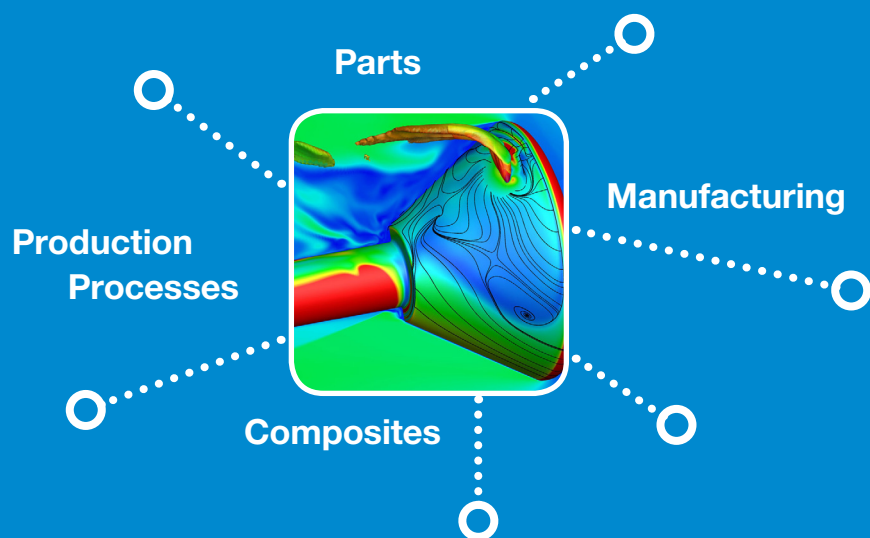**U.S. Government Purpose Release**

User-Friendly Metadata
GSC-15014-1

The User-friendly Metadata (UFM) tool functions as a filter. The tool accepts an ODL file as input and generates a simple HTML representation of the ODL as output. Command-line options provide a user with the ability to modify the program's functionality. Please visit: <http://opensource.gsfc.nasa.gov/projects/UFM/index.php>
Open Source

3

Materials and Processes

Parts

Manufacturing

Production
Processes

Composites

Ablation Modeling Program to Determine Minimum Weight of Protection Material   MSC-24842-1

The Ablation Modeling Program determines the minimum weight of n-layer thermal protection system (TPS) material necessary to meet mission and spacecraft parameters and constraints. Although first developed in the 1970s, the tool has been modified recently and offers applicability to other heat-shield protection ablators with associated differences in material composition and chemistry. The software can calculate a required TPS thickness for a specific temperature constraint or determine temperatures and recession for a specific design thickness.
U.S. Government Purpose Release

BaseCoat Software (BCS)   MSC-25567-1

BaseCoat Software (BC) collects the coating condition inspection data of launch processing facilities. The tool accounts for coating service life, corrosion damage, and criticality.
U.S. Government Purpose Release

Boundary Layer Integral Matrix Procedure–Kinetic (BLIMPK)   MSC-24715-1

BLIMPK offers an improved process for computing aero-thermodynamic surface heating. The tool was developed to update surface material properties in order to model damage and repairs to the Space Shuttle Orbiter's thermal protection system (TPS). The technology extracts streamline properties from a viscous non-equilibrium solution instead of a standard inviscid (Euler) solution. This capability allows BLIMPK to resolve the adverse pressure gradient when a streamline passes through a shock-shock interaction region.
U.S. Government Purpose Release

Computational Fluid Dynamics (CFD) Script for Rapid Thermal Protection System (TPS) Damage Assessment   MSC-24865-1

This UNIX/Linux innovation takes a large-scale geometry grid, modifies the grid with a "patch" that models TPS aero-heating damage, and generates a CFD solution over the patch.
U.S. Government Purpose Release

Chemistry and Thermodynamics of Solid Waste Streams Used in Waste-to-Energy (WTE) Systems   MSC-25516-1

This NASA-developed tool produces detailed chemical and thermodynamic models of deep-space exploration waste streams that can be used in designing technologies for waste-to-energy systems.
U.S. Government Purpose Release

Common Bolted Joint Analysis Tool (ComBAT)   MSC-24836-1

ComBAT is a powerful, yet easy-to-use Excel/VB-based bolted joint analysis/optimization computer program. The tool, which can be used by both seasoned and inexperienced analysts, lays out a systematic foundation to determine the appropriate fastener size, material, and assembly torque needed for a given design. Users can perform numerous "what-if" scenarios within minutes to arrive at an optimal solution.
U.S. Release Only

EXOS Software (Improved)   MSC-24803-1

This innovation improves EXOS software by enabling the modeling of fabrics, mixtures, and porous materials. The tool also provides the ability to accept hex mesh geometries.
U.S. Government Purpose Release

LES Triangles (LES_T)   MSC-25585-1

The LES_T geometry calculator can be used for machining sheet metal design templates to ensure accurate material cuts.
U.S. Government Purpose Release

Maskless Creation of Small Structures with Selective Deposition of Gold Nanoparticles (GOLD BLACK)　　　GSC-15734-1

GOLD BLACK helps to combat the condensation of gold particles adjacent to the path of an illumination beam.
U.S. Release Only

Materials and Processes Technical Information System (MAPTIS-II)　　　MFS-32206-1

The Materials and Processes Technical Information System (MAPTIS-II) is an information technology that offers a number of services for acquiring, processing, and disseminating information about materials, materials properties, materials processes, and manufacturing. Content includes materials test results from legacy systems, design allowables, and other online products. The MAPTIS-II technology provides ready access to accurate data using standard computers, software, and the Internet.
U.S. Government Purpose Release

NASA Shuttle Launch Depot (NSLD) Raw Material Database Web Application　　　MSC-25558-1

This custom application has been used to track information about raw materials in storage, including dimension, description, inventory quantity, and lot number.
U.S. Government Purpose Release

Pressure Vessel System (PVS)　　　MSC-25557-1

This custom Web-based application has been used to view and update Pressure Vessel System (PSA) and PSA component data and relate the information to the hardware certification reporting function in Documentum.
U.S. Government Purpose Release

Ray-Tracing Math Model　　　KSC-12835

The Ray-Tracing Math Model will predict the intensity of infrared heat energy that can be projected from a halogen lamp or a cluster of lamps. While NASA utilized the tool in the Space Shuttle program, the application can be extended to accommodate other optical and acoustic ray-tracing applications. The current version of the technology assumes ideal parabolic surfaces and reflectors.
U.S. Release Only

Shuttle Infrared Image Analysis Software (SIRIAS)　　　GSC-14852-1

The SIRIAS software and related processes provide subsurface information on a sample undergoing thermography. This information (which is comparable to that which would be gained from taking an MRI) has been generated solely from using infrared images taken by a Commercial Orbital Transportation Services (COTS) camera and MATLAB processing.
U.S. Government Purpose Release

Stability Spectrum Through Hilbert-Huang Transform　　　GSC-14833-1

Contrary to other Hilbert-Huang calculations, this NASA technology retains information on the mathematical signs of damping, which helps in identifying regions of instability.
U.S. Government Purpose Release

Surface Crack Potential Difference (SCPD) Software　　　MFS-32848-1

The Surface Crack Potential Difference (SCPD) monitoring software provides the precise relationship between a crack measurement signal and the size of an arbitrary semi-elliptical crack.
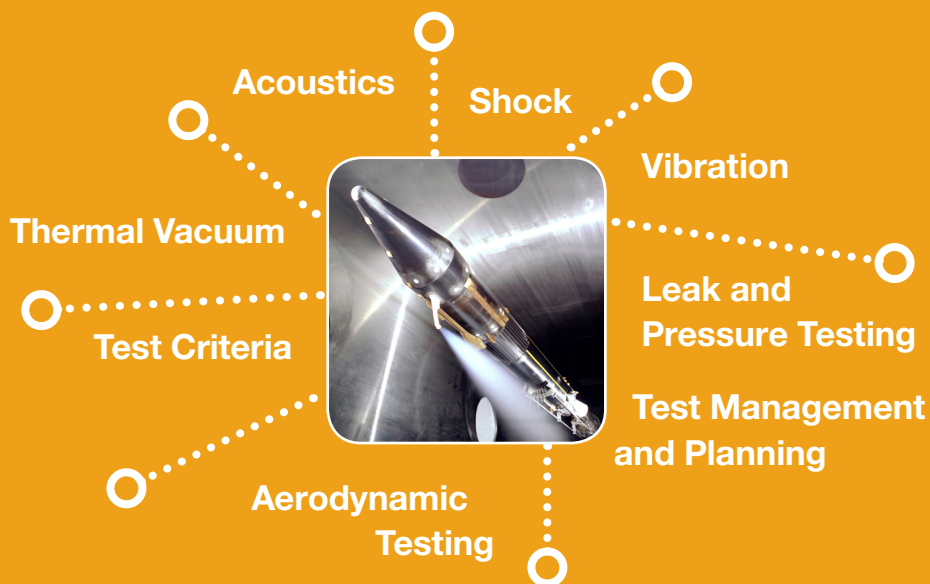**U.S. Government Purpose Release**

Tool for Analysis of Surface Cracks (TASC)   **MFS-33082-1**

Created using the commercial math analysis software MATLAB, TASC enables the easy computation of nonlinear J-integral solutions for surface-cracked plates in tension by accessing and interpolating between the 600 nonlinear surface crack solutions documented in NASA/TP–2011-217480. The only required inputs to the program are the surface crack dimensions, plate cross-section dimensions, and material properties. TASC provides a convenient and easy-to-use interface for the solution set that allows a novice user to obtain a fast and reliable fracture toughness solution.
General Public Release

4

System Testing

Acoustics

Shock

Vibration

Thermal Vacuum

Leak and
Pressure Testing

Test Criteria

Test Management
and Planning

Aerodynamic
Testing

3D Aero-Acoustics Propagation Code (CDUCT-LaRC)　　　　　　　　LAR-16540-1

CDUCT-LaRC provides a flexible and efficient environment in which to study propagation within and radiation from complex duct geometries. Code development has followed an approach that attempts to separate the main functional capabilities into specific modules. In this way, as new approaches become available, they may be incorporated more efficiently. CDUCT-LaRC is currently composed of five modules: input and output specification, computational fluid dynamics (CFD) and acoustic grid generation, background flow calculation, duct acoustic propagation, and duct acoustic radiation. As the name suggests, the input and output specification module handles the data input/output for the entire package. The CFD and acoustic grid generation module automatically generates structured multi-block computational grids suitable for mean flow and propagation calculations. The background flow module currently incorporates a compressible, inviscid flow solver to generate the mean flow information necessary for subsequent acoustic calculations. The acoustic propagation module of the code calculates the propagation of a given acoustic source ahead of the fan face or aft of the exhaust guide vanes in the inlet or bypass ducts of realistic jet engines geometries. Non-uniform (i.e., circumferentially and/or radially segmented) acoustic lining may also be incorporated into these calculations. Finally, the acoustic radiation module provides the capability to calculate the radiated acoustic pressure field at various observer locations.
U.S. Release Only

Acoustic Propagation and Emulation Toolset (APET)　　　　　　　　LAR-17761-1

The Acoustic Propagation and Emulation Toolset (APET) is a framework code uniting several acoustic methodologies for the propagation and measurement of source noise audibility at farfield observers, accounting for the effects of the atmosphere, weather, terrain, and spherical spreading. Currently, APET consists of a modified version of the Rotorcraft Noise Model (RNM, Version 7) coupled with the newly developed Spectral Attenuation Method (SAM) that contains the Ray Tracing Program (RTP) and two versions of a Greens Function Parabolic Equation (GFPE) code. A third component of APET is an audibility prediction scheme based on the work of Abrahamson, initially called ICHIN (I Can Hear It Now) and further developed by Wyle Labs as AUDIB.
U.S. Release Only

Advanced Subsonic and Supersonic Propeller Induced　　　　　　　　LAR-17590-1
Noise (ASSPIN) Input/Output Data Manipulation Tools (ASP_Tools)　　LAR-17591-1

ASSPIN is a computer program that predicts the noise generated by propellers operating at subsonic, transonic, or supersonic helical tip speeds in either single-rotation or counter-rotation mode. The format of blade surface pressure data obtained from aerodynamic codes for ASSPIN input is generally not compatible with that required by ASSPIN. The ASP_Tools suite provides the capability to manipulate blade geometry and surface pressure data to produce proper ASSPIN input. In addition, the ability to parse ASSPIN output files and obtain specific output variables is provided.
U.S. Release Only

Advanced Subsonic and Supersonic Propeller　　　　　　　　
Induced Noise (ASSPIN) Prediction Program　　　　　　　　　　　LAR-17590-1

ASSPIN is a computer program that predicts the noise generated by propellers operating at subsonic, transonic, or supersonic helical tip speeds in either single-rotation or counter-rotation mode. The prediction method is based on two theoretical time-domain formulations of Farassat. Input to ASSPIN consists of blade kinematic and geometric quantities and either steady or periodically unsteady blade surface pressure. Program output includes propeller power and thrust coefficients, as well as the periodic acoustic signatures and acoustic spectra for the thickness, loading, and combined noise.
U.S. Release Only

AirShow 1.1.1 — LEW-17228

The AirShow software package enables 3D visualization of computational meshes and computed flow-field data associated with computational fluid dynamics (CFD). The program displays structured grid blocks and computational grid planes.
U.S. Release Only

Arbitrary Accuracy Nonlinear Euler Solver — LEW-17465

This NASA-developed code is the first in the world to solve the nonlinear Euler equations to at least 15th-order accuracy in space and time in two dimensions. It is capable of even higher order accuracy if sufficient computer precision is available.
U.S. Release Only

Automated Camera Calibration Software (ACCS) — JPL-41312

Using collected metrology data, the ACCS system significantly increases the efficiency of the entire camera calibration process, resulting in reduced costs and turnaround time. Even in extreme conditions, the tool performs calibrations with minimal user input.
U.S. Government Purpose Release

Automation Hooks Architecture (AHA) — MSC-24852-1

AHA combines several emerging technologies to provide a flexible, scalable, and easy-to-implement test orchestration infrastructure. The tool is composed of three parts: an interface standard, a test flow and data management tool, and a logical test element implementation. Through its use of emerging Web service protocols, certain elements of AHA can be accessed with a variety of off-the-shelf commercial software.
U.S. Government Purpose Release

BALFIT—A Wind Tunnel Strain-Gage Balance Calibration Analysis Software Package — ARC-15804-1

BALFIT software performs a calibration analysis of multi-component strain-gage balances that are used to measure forces and moments during wind tunnel tests. The analysis software uses automatically determined math models for the global regression of balance calibration data.
U.S. Government Purpose Release

Booster Launch Operations Center (BLOC) Custom Software — MSC-25367-1

The Booster Launch Operations Center provided NASA with real-time monitoring of the Space Shuttle's integrated testing while it was in the Vehicle Assembly Building (VAB) or on the launch pad. USA Design Engineering manned the facility and used this software to monitor the Solid Rocket Booster subsystems (i.e., Range Safety, Electrical and Instrumentation, and Thrust Vector Control) using a data feed from the main firing room.
U.S. Government Purpose Release

CARES/LIFE — LEW-16018

This NASA software was developed to predict the reliability and life of structures made from advanced ceramics and other brittle materials (e.g., glass, graphite, and intermetallics).
U.S. Release Only

Coldfire SDN Hardware Diagnostics — GSC-15478-1

The Coldfire SDN Diagnostics Software is a flexible framework used to exercise, test, and debug custom hardware. The tool can be used on multiple NASA projects and can be customized using different processors and interfaces. This version of the technology is configured for the Coldfire processor on the SDO SDN processor boards.
U.S. Government Purpose Release

Community Noise Test Environment (CNoTE) LAR-17560-1

The Community Noise Test Environment (CNoTE) system is a combination of commercial off-the-shelf computer hardware and software and NASA/contractor-developed software. The function of the system is to simulate community noise events (e.g., aircraft flyover noise) in a virtual audio and visual environment for the purpose of soliciting subjective responses. The system is composed of an AuSIM, GoldMiner audio server for audio simulation, a graphics computer for visual simulation, a controller computer for staging events, and a portable computer for entering subjective responses. The audio is played back over commercially available headphones, and the graphics may be rendered on various commercially available devices including CRT monitors, head-mounted displays, and CAVE immersive environments.
U.S. and Foreign Release

Coupled Structural, Thermal, Acoustic, Electromagnetic (CSTEM) Analysis LEW-17052

CSTEM is a UNIX executable for coupled structural, thermal, acoustic, and electromagnetic analysis and optimization.
U.S. Release Only

Defect Detection and Prevention (DDP) JPL-20741

DDP evaluates criticality by generating a tree of failure modes and a tree of requirements and then evaluating the impact of each failure mode on each requirement.
U.S. Government Purpose Release

Development of Automated Structural Health Monitoring and Qualification
Methods and Software for Composite Overwrapped Pressure Vessels MSC-25421-1

NASA has integrated industry-standard and new, novel analysis methods for assessing the structural health of composite overwrapped pressure vessels (COPV). By significantly increasing throughput, the software has the ability to provide real-time assessments. Adaptive analysis methods have been incorporated into the technology to provide modal analyses at specified points of a structure's life (e.g. loading, unloading, and dwells), thereby increasing the tool's utility and ease of use for acoustic emission testing.
U.S. Government Purpose Release

Fan Broadband Noise Prediction Code LEW-17279

This NASA-developed technology predicts the dipole and quadruple noise that results from the interaction of anisotropic homogeneous turbulence with a rotor or stator.
U.S. Release Only

Fast Scattering Code (FSC), Versions 3.1 and 3.2 LAR-17828-1

The Fast Scattering Code (FSC) is a computer program designed to predict the scattered acoustic field that results from the interaction between a known incident sound and arbitrary three-dimensional surfaces immersed in a potential background flow. The technology is based on the equations of time-harmonic, linearized acoustics and employs equivalent sources for solving an exterior Helmholtz equation boundary value problem (BVP). The incident sound can be generated by the FSC using a collection of simple point multipoles (monopoles and dipoles), or it can be provided by the user from other prediction codes. Predictions for high-frequency/large scale-combinations yield linear systems with millions of unknowns and memory requirements beyond the capabilities of most advanced computer systems to date. The computational engine of the FSC has been totally redesigned to alleviate the frequency limitations of the code by employing numerical algorithms that drastically reduce computer resource utilization and take advantage of multiprocessor platforms.
U.S. Release Only

FATMaCC Five-Axis, Three-Magnetic-Bearing Control Code   LEW-17293

This code achieves full rotor levitation and control at a loop time of 50 microseconds. It will control a five-axis system in either a centralized or decentralized mode at a loop time of 56 microseconds.
U.S. Release Only

Geophysical Finite Element Simulation Tool (GeoFEST)   GSC-14846-1

Consisting of approximately 7,000 lines of C source code, GeoFEST is a two- and three-dimensional finite element package for modeling solid stress and strain in geophysical and other continuum domain applications. The software runs on diverse UNIX derivatives, including Linux, HPUX, and SunOS. GeoFEST is descended from an earlier-generation Fortran code running under VAX VMS (VISELAS) and an earlier UNIX C code (VISCO).
U.S. Government Purpose Release

Geophysical Finite Element Simulation Tool (GeoFEST), Version 4.3(P)   GSC-14847-1

Consisting of approximately 11,000 lines of C source code, GeoFEST (Version 4.3P) is a two- and three-dimensional finite element package for modeling solid stress and strain in geophysical and other continuum domain applications. The software runs on diverse UNIX derivatives, including Linux, HPUX, and SunOS. GeoFEST's computational engine employs Crout factorization for the direct inversion of the finite element matrices (as well as conjugate gradient for an iterative solution option). Data formats can be adapted to accommodate visualization and graphically oriented input/output. Physics models supported by the code include isotropic linear elasticity and both Newtonian and power-law viscoelasticity via implicit/explicit quasi-static time stepping. In addition to triangular, quadrilateral, tetrahedral, and hexahedral continuum elements, GeoFEST supports split-node faulting, body forces, and surface tractions.
U.S. Government Purpose Release

GRAPE.107   LEW-16851-1

GRAPE is a two-dimensional elliptic grid generation code to be used with isolated airfoils. This modified version of the software (with application for turbomachinery blades) can generate grids for the RVCQ3D turbo-machinery analysis code.
U.S. Release Only

High-Speed Data Viewer   MFS-31700-1

The High-Speed Data Viewer computer software was developed for viewing high-frequency data recorded in the East and West Test Areas at Marshall Space Flight Center (MSFC).
U.S. Release Only

IceVal DatAssistant   LEW-18343

This NASA-developed technology provides an improved mechanism for managing the large volume of data generated and utilized in performing icing research.
U.S. Release Only

Integrated Corrective/Preventive Action Tracking System (ICATS)   MSC-23759-1

Designed for the identification and administration of non-conformances that require corrective or preventive action, the Web-based ICATS software solution records, tracks, and reports task results. The tool includes workflow features to manage root cause analyses, planned actions, estimated completion dates, records of implementation, effectiveness verifications, and task closures.
U.S. Government Purpose Release

Integrated Structural Analysis and Test Program   GSC-14775-1

This technology offers an innovative way of integrating analysis/test data to facilitate the mechanical verification of space systems. The technology automates repetitive processes, provides faster pre-test analysis and test reporting, facilitates test planning, and improves test execution.
U.S. Government Purpose Release

International Space Station (ISS) Systems Integration Laboratory (ISIL)   MSC-24341-1

This NASA-developed software provides an open-source framework that consolidates ISS laboratory test functions. The technology automates the start-up process of the large ISIL test rig (including configuration validation) and provides test engineers with Web access to recorded test data for post-test analysis.
U.S. Government Purpose Release

Jet Noise Prediction Code (JeNo)   LEW-18199

JeNo is a Fortran 90 computer code that calculates the far-field sound spectral density produced by axisymmetric jets at user-specified observer locations and frequency ranges. The user must provide a structured computational grid and also input a mean flow solution from a Reynolds-Averaged Navier Stokes (RANS).
U.S. Release Only

Jet Noise Prediction Code (JeNo 2.5D)   LEW-18199

JeNo is a Fortran 90 computer code that evaluates the far-field turbulence-generated noise in non-axisymmetric jets. The propagation Green's function is calculated along a user-specified azimuthal angle (line of sight), but source volume integration is carried out in 3D. The user must provide a structured computational grid in a polar coordinate system and also input a mean flow solution from a Reynolds-Averaged Navier Stokes (RANS).
U.S. Release Only

Lag Model—A Turbulence Model for Attached and Separated Flows   ARC-14645-1

This NASA-developed technology includes a set of partial differential equations that augment the Reynolds-averaged Navier-Stokes equation. By providing a mechanism that allows flow history to affect turbulence stresses, Lag Model mimics underlying physical processes to provide an improved turbulence model for flows with separation.
U.S. Government Purpose Release

LEWICE 3.2.2 Ice Accretion Software   LEW-18573-1

LEWICE contains an analytical ice accretion model that evaluates the freezing process thermodynamics that occur when super-cooled droplets impinge on a body. Both atmospheric parameters (i.e., temperature, pressure, and velocity) and meteorological parameters (i.e., liquid water content, droplet diameter, and relative humidity) are used to determine the shape of the ice accretion.
U.S. Release Only

LINFLUX, 3D Linearized Unsteady Aerodynamic Analysis   LEW-17346

LINFLUX is a three-dimensional, linearized, unsteady aerodynamic analysis (and code) that can be used to predict the aero-acoustic/aero-elastic responses of axial-flow turbo-machinery blade rows to aerodynamic/structural excitations.
U.S. Release Only

MERIDLN   LEW-16369-1

MERIDLN is a Fortran program for calculating velocities/streamlines of axial-, radial-, or mixed-flow turbo-machinery or annular ducts on the hub-shroud mid-channel stream surface.
U.S. Release Only

MGBK Jet Noise Prediction Code   LEW-17062

The physics-based MGBK code predicts subsonic and low-supersonic jet mixing noise and shock noise. Predictions are in the form of far-field sound pressure level (SPL) and frequency spectra on an arc or a sideline.
U.S. Release Only

MPS FRT Analysis Analytical Tool (MPS FRT AAT)   MSC-25588-1

This LabVIEW program has been used to analyze Space Shuttle Main Engine (SSME) flight-readiness LPS data to verify the successful completion of test requirements.
U.S. Government Purpose Release

MPS Software Pull-In Drop-Out Test (MPS SPDT)   MSC-25589-1

In order to verify the functionality of Orbiter hardware, this high-speed data-logging tool has been used to record the draw applied to solenoid actuators.
U.S. Government Purpose Release

MPS Software Signature Trace Test (MPS SSTT)   MSC-25592-1

In order to verify the functionality of Orbiter hardware, this high-speed data-logging tool has been used to record the draw applied to several pneumatic and propellant solenoids as the solenoids are re-energized/de-energized and opened/closed.
U.S. Government Purpose Release

Multiple Kernel Anomaly Detection (MKAD) Algorithm   ARC-16462-1

In offline mode, MKAD performs automated anomaly detection on large heterogeneous data sets that contain both discrete symbols and continuous data streams. The MKAD software can be found at: <http://ti.arc.nasa.gov/opensource/projects/mkad/>
Open Source

Multiple Pure Tone (MPT) Noise Code   LEW-17386-1

The MPT noise prediction procedure is based on uniform-rotor computational fluid dynamics (CFD) analysis of BPF tonal content in conjunction with engineering (statistical) correlation information of blade-to-blade non-uniformity effects.
U.S. Release Only

NDE Wave & Image Processor (NDEWIP V3.0)   LEW-18640-1

The NDE Wave & Image Processor software application has been created to provide a state-of-the-art, comprehensive, integrated science-based tool for the advanced visualization, processing, and analysis of NDE and health-monitoring waveform- and image-based data. With NDEWIP, the user has access to a complete post-processing capability in a single tool. Although the software has been developed for the NDE professional, the technology could be used for any other RF signal or image processing and analysis application.
U.S. Release Only

NESSUS 6.2C   LEW-18229

The NESSUS 6.2c computer program is a set of separate but related modules for solving a wide range of component and system probabilistic and reliability problems, including finite element analysis, heat transfer analysis, geometry generation, and ceramic material property generation.
U.S. Release Only

OTIS 4—A Trajectory Optimization Computer Code   LEW-18319

OTIS 4 is a Fortran program designed to simulate and optimize trajectories of launch vehicles, aircraft, missiles, satellites, and interplanetary vehicles. The software is restricted by export control.
U.S. Release Only

OXIMAP—A Model for the Oxidation of C/SiC Composite Structures   LEW-18212

The OXIMAP software has been used to analyze the oxidation behavior of carbon-fiber-reinforced composite structures.
U.S. Release Only

Payloads and Components Real-Time Automated Test System (PACRATS)   MFS-31383-1

The PACRATS data acquisition program allows test engineers to acquire, display, store, and retrieve test data.
U.S. Release Only

PCSTAGE   LEW-16325

PCSTAGE is simple computational simulation of multi-stage turbo-machinery blade-to-blade flows on a surface of revolution.
U.S. Release Only

PMESH   LEW-18402

The PMESH grid-generation program produces three-dimensional blade-passage meshes for the computational fluid dynamics (CFD) modeling of advanced single- or counter-rotation turboprops and propfans.
U.S. Release Only

Propulsion Diagnostic Method Evaluation Strategy (ProDiMES), Version 1.0   LEW-18371

The Propulsion Diagnostic Method Evaluation Strategy (ProDiMES) provides a standard benchmarking problem and a set of evaluation metrics to enable comparison of candidate aircraft engine gas-path diagnostic methods. The MATLAB-based tool enables users to develop and evaluate diagnostic methods independently.
U.S. Release Only

Quick Charge-Coupled Device (CCD) Design Code for Centrifugal Compressor   LEW-17452

This NASA-developed technology provides a rapid preliminary assessment of the design geometry and the design-point performance of centrifugal compressors. The analysis is based on a one-dimensional flow model with correlations for the following losses: inlet guide vane, rotor inlet shock, incidence, clearance, blade loading, skin friction, disk friction, recirculation, vaneless diffuser skin friction, and vaned diffuser. With input performance, the code can operate in design mode; with input geometry, the code can operate in analysis mode.
U.S. Release Only

Radial Turbine Off-Design (RTOD) Performance Code   LEW-14060

The RTOD code predicts the performance of a single-stage radial-inflow turbine (with either radial or swept rotor blades) as a function of pressure ratio, speed, and stator setting.
U.S. Release Only

RAT-EDA   LEW-18321

This NASA-developed technology is a MATLAB-language computer program for exploratory data analysis. Through the fast post-processing of measured time-series Raman spectral data, RAT-EDA reveals thermo-chemical properties and turbulent-chemistry interactions in combustion. The computer program deduces probability density functions of combustion temperatures using user-selected super-pixel regions for each major species (e.g., O_2, N_2, CH_4, CO_2, or H_2O).
U.S. Release Only

Rotorcraft Noise Model (RNM), Version 7 — LAR-17753-1

The RNM simulation model calculates community noise, computing time histories of noise for arbitrary vehicle flight operations. The technology accommodates multiple noise sources (e.g., rotors and engines), each represented by a sphere of spectral data at a reference distance. Propagation to the ground accounts for spherical spreading, atmospheric absorption, ground impedance effects, and limited weather effects.
General Public

Rotor-Stator Interaction (RSI) Broadband Noise Prediction Code — LEW-18131

RSI is a Fortran computer code for calculating the spectrum of broadband noise produced by the interaction of fan-rotor wake turbulence with fan-exit guide vanes (i.e., the stator). Provided with incident-turbulence characteristics, the code computes the spectra of acoustic power upstream and downstream of the stator on a mode-by-mode basis at each frequency of interest. Target frequencies are arbitrary and need not be harmonics of a fan's blade-passing frequency.
U.S. Release Only

RTD Radial-Inflow Turbine Conceptual Design Code — LEW-17453

The RTD code executes a conceptual design for a single-stage radial-inflow turbine. A mean-line analysis is performed for the locations having constant radius over the blade span. Constant span-fraction sectors are used at the rotor exit. The analysis can account for stator end-wall clearance flow and swept rotor blades. The loss model includes stator and rotor passage losses, trailing-edge losses, vaneless space loss, disk-friction loss, and rotor-exit clearance loss.
U.S. Release Only

RVCQ3D.406 — LEW-16851-1

RVCQ3D is a two-dimensional computational fluid dynamics (CFD) analysis code for turbo-machinery (e.g., compressors, turbines, and mixed-flow machines). The technology solves Navier-Stokes equations on a blade-to-blade surface of revolution using explicit finite-difference techniques. Three differencing schemes are available: central differences, AUSM+, and H-CUSP. Three turbulence models are also available: Baldwin-Lomax, Cebeci-Smith, and Wilcox 2006 K-Omega.
U.S. Release Only

Solar Array Verification and Analysis Tool (SAVANT) — LEW-17681

The powerful, yet easy-to-use SAVANT quick-engineering code calculates the expected radiation damage to solar cells in Earth orbit. The tool contains ten types of solar cells and four types of cover glass. Radiation damage calculations are based on the Displacement Damage Dose method developed at the Naval Research Laboratories.
U.S. Release Only

sBOOM—An Advanced Sonic Boom Propagation Tool — LAR-18012-1

Very useful in the development of supersonic cruise aircraft, this NASA-developed propagation tool predicts sonic-boom ground signatures by numerically solving the Augmented Burgers equation. Efficient and accurate, sBoom can predict shock thicknesses, thereby improving the frequency spectrum of ground signatures. Because shock rise times are computed and not empirically adjusted or corrected, the tool affords more accurate loudness calculations than comparable linear-theory methods.
U.S. Release Only

SCISEAL — LEW-16330

This computer program has been used to study the fluid dynamic forces in SEALS.
U.S. Release Only

Sound Lab (SLAB), Version 5 — ARC-14991-1

SLAB is a software-based, real-time, virtual acoustic-environment rendering system designed to study spatial hearing in environments such as concert halls, listening rooms, virtual reality, aviation spatial information displays, and video game sound effects. SLAB can be downloaded at: <http://ti.arc.nasa.gov/opensource/projects/slab-spatial-audio-renderer/>
Open Source

SmaggIce UNIX, Version 1.8 — LEW-17399

The SmaggIce software toolkit can be used to create structured grids for 2D iced airfoils in preparation for computational fluid dynamics (CFD) analysis. Software tools will measure ice shape characteristics, add artificial ice shapes, prepare an ice surface for gridding, perform domain decomposition, create and modify grids, analyze grid quality, and output grids for subsequent input into flow solvers.
U.S. Release Only

SmaggIce UNIX, Version 2.0 — LEW-17399

The SmaggIce software toolkit can be used to create structured grids for single- or multi-element 2D iced airfoils in preparation for computational fluid dynamics (CFD) analysis. Software tools will measure ice shape characteristics, add artificial ice shapes, prepare an ice surface for gridding, perform domain decomposition, create and modify grids, analyze grid quality, and output grids for subsequent input into flow solvers.
U.S. Release Only

SmaggIce Windows, Version 2.0 — LEW-17399

The SmaggIce software toolkit can be used to create structured grids for single- or multi-element 2D iced airfoils in preparation for computational fluid dynamics (CFD) analysis. Software tools will measure ice shape characteristics, add artificial ice shapes, prepare an ice surface for gridding, perform domain decomposition, create and modify grids, analyze grid quality, and output grids for subsequent input into flow solvers.
U.S. Release Only

Soft Decision Analyzer (SDA) — MSC-24798-1

The Soft Decision Analyzer (SDA) hardware, firmware, and software system performs real-time closed-loop statistical analysis of single- or dual-channel serial digital RF communications systems operating in very low signal-to-noise conditions. The technology can instrument a live system and correlate observations with frame, code word, and packet losses as well as Quality of Service (QoS) and Quality of Experience (QoE) events.
U.S. Government Purpose Release

Software for Compumotor 6K Series Controller — GSC-14744-1

This software controls a multi-axis motor system via a Compumotor 6K Series controller. Capable of running a two-motor system with encoders, the software can be used to issue individual commands to a controller for troubleshooting purposes, set position targets for the encoders, receive encoder feedback, turn over control of a motor system to a joystick or other device, and record positional data from encoders to an external file.
U.S. Government Purpose Release

SWIFT, v.400 — LEW-17635

SWIFT is a multi-block computational fluid dynamics (CFD) analysis code for turbo-machinery. The software, which solves Navier-Stokes equations using explicit finite-difference techniques, can be used for linear cascades, isolated blade rows, or multistage machines. Three differencing schemes are available: central differences, AUSM+, and H-CUSP. Three turbulence models are also available: Baldwin-Lomax, Cebeci-Smith, and Wilcox 2006 K-Omega.
U.S. Release Only

System Identification Programs for AirCraft (SIDPAC)   LAR-16100-1

Written in MATLAB, SIDPAC is a collection of over 300 programs that perform a wide variety of tasks related to system identification applied to aircraft. SIDPAC includes tools for experiment design, data analysis, kinematic consistency checking, static and dynamic modeling, simulation, numerical integration and differentiation, smoothing, filtering, finite Fourier transformation, statistical modeling and evaluation, optimization, parameter estimation, model accuracy quantification, model validation, and more.
General Public Release

Systematic Sensor Selection Strategy (S4) Software   LEW-18815-1

The Systematic Sensor Selection Strategy (S4) optimally selects a sensor suite from a larger pool of candidate sensors based on their performance in a diagnostic system. S4's user-defined fault-diagnostic approach considers conflicting objectives including cost, weight, and reliability.
U.S. Release Only

TCGRID v.400   LEW-17635

TCGRID is a three-dimensional grid-generation code for turbo-machinery blades. The software can generate single- or multi-block grids that are compatible with several computational fluid dynamics (CFD) analysis codes, including SWIFT and ADPAC.
U.S. Release Only

TD2 Axial Turbine Design and Performance Code   LEW-11029

TD2 performs a streamline analysis that can use meridional velocity gradients to control the radial distribution of work and flow for multistage, multishaft, cooled/uncooled axial-flow turbines. The effects of streamline slope and curvature are included in the radial equilibrium. Hub and tip radii are specified at inlet, at exit, and between each blade row, and velocity diagrams for each stage can be individually controlled. An internal loss correction determines blade-row total-pressure-loss coefficients along the streamlines.
U.S. Release Only

Tempest   LEW-17294

Tempest was created to provide Internet/Intranet connectivity to real-time embedded applications.
U.S. Release Only

Tone Fan Noise Design/Prediction System (TFaNS 1.4)   LEW-17063

TFaNS predicts tone noise emanating from a fan stage, including the effects of reflection and transmission by the rotor and stator and by the duct inlet and nozzle.
U.S. Release Only

Tone Fan Noise Design/Prediction System (TFaNS 1.5)   LEW-17063

TFaNS predicts tone noise emanating from a fan stage, including the effects of reflection and transmission by the rotor and stator and by the duct inlet and nozzle. Version 1.5 upgrades include: the SOURCE3D subprogram's ability to perform transmission-loss calculation for modes scattering into themselves; the inlet and aft radiation codes' use of infinite envelope elements in the far-field; and the AWAKEN subprogram's use of a new Acoustic Wake/Turbulence File format.
U.S. Release Only

Time-Accurate, Sectored, One-Dimensional Reactive Code
for Simulation, Prediction, and Control of Combustion Instabilities   LEW-17677-1

This sectored one-dimensional model utilizes a simplified computational fluid dynamics (CFD) algorithm to simulate combustion and acoustic processes (including instabilities) in combustors with complex shapes. Utilizing modest computational resources, the code produces realistic results and is well suited for controls development.
U.S. Release Only

4. System Testing

TSONIC
LEW-P26

The TSONIC Fortran program calculates the transonic velocity on the blade-to-blade stream surface of a turbo-machine.

U.S. Release Only

Vehicle Acoustic Environment Prediction Program
MFS-31904-1

The Vehicle Acoustic Environment Prediction Program was developed in 1988 and used in Phase A acoustic environments for engine testing in flight vehicles at liftoff.
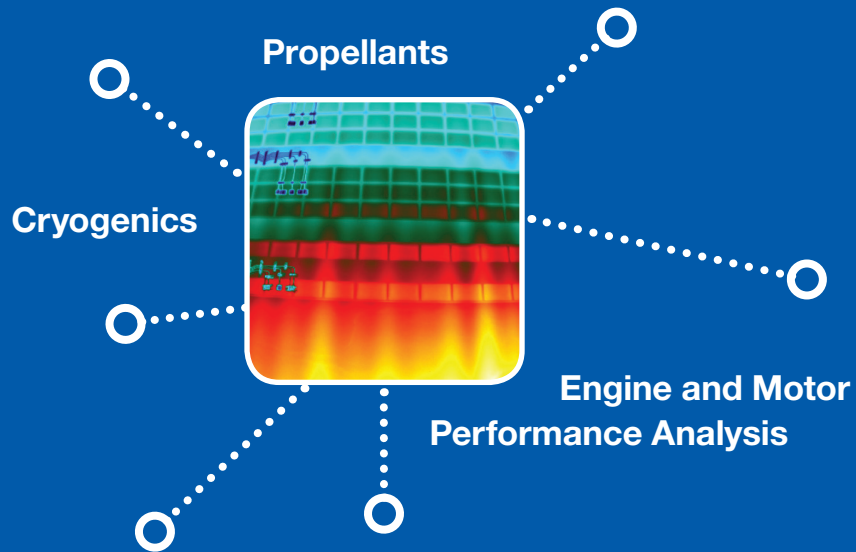
U.S. Government Purpose Release

WOPWOP
LAR-16680-GS

WOPWOP is used for helicopter main-rotor noise prediction. The user must input measured air loads.

U.S. Release Only

5

Propulsion

Propellants

Cryogenics

Engine and Motor
Performance Analysis

ACD Aerodynamic Design of Multistage Axial-Flow Compressors   LEW-17448

ACD is an analysis code used for the aerodynamic design of multistage axial-flow compressors. The technology provides velocity diagrams on the streamlines at the blade-row edges. Blade elements are defined by centerline curve and thickness distribution, and blade-element inlet and outlet angles are established through empirical incidence and deviation-angle adjustments to the velocity diagrams. Blade elements can be stacked to provide the full blade design.
U.S. Release Only

ACOD Multistage Axial-Flow Compressor Off-design   LEW-17449

A companion tool to Glenn Research Center's ACD software (LEW-17448), ACOD is streamline analysis code for predicting the off-design performance of multistage axial-flow compressors. Flow, blading, and loss are modeled similarly to ACD.
U.S. Release Only

Advanced Ducted Propfan Analysis Code (ADPAC)   LEW-16768

Note: Software Restricted by Export Control
Developed by the Allison Engine Company under contracts with Glenn Research Center, ADPAC solves tightly coupled internal/external flows through future-concept short-duct turbofan engines.
U.S. Release Only

Axial-Flow Turbine Off-Design (AXOD) Performance   LEW-16323

AXOD computes the flow and efficiency of multistage axial-flow turbines as functions of speed and pressure ratio. The technology uses a span-line analysis with simple radial equilibrium. The loss model includes blade-row inlet losses, blade-row losses, and stage-test losses. Coefficients are selected to match the known design-point performance, and the internal model provides the off-design performance.
U.S. Release Only

BLAYER   LEW-P44

BLAYER is a Fortran program used for calculating compressible laminar and turbulent boundary layers in arbitrary pressure gradients.
U.S. Release Only

Boundary-Layer Matrix Procedure Kinetic (BLIMPK) Modernization and Upgrade   MSC-25641-1

Written in Fortran, BLIMPK solves boundary-layer equations for arbitrary chemically reacting gases. NASA, the Department of Defense, and industry have all used the software in the design and evaluation of rocket nozzles and reentry spacecraft.
U.S. Government Purpose Release

Broadband Fan Noise Prediction System (BFaNS)   LEW-17307

BFaNS computes the broadband noise generated by a turbofan engine's fan stage. Noise sources can include turbulence impingement and boundary-layer turbulence convection.
U.S. Release Only

Centrifugal Off-Design Performance (CCODP) Compressor   LEW-17450

CCODP is a one-dimensional off-design performance prediction code used for centrifugal compressors. Correlations account for the following types of loss: inlet guide vane, impeller incidence, shock, skin friction, blade loading, trailing edge, clearance, vaneless and vaned diffuser friction, recirculation, and disk friction.
U.S. Release Only

Chemical Equilibrium Applications (CEA)　　　　　　　　　　　　　　　　LEW-17687

The CEA program calculates chemical equilibrium product concentrations from any set of reactants and determines thermodynamic and transport properties for the product mixture. Built-in applications account for theoretical rocket performance, Chapman-Jouguet detonation parameters, shock-tube parameters, and combustion properties.
U.S. Release Only

CMPSTK Multi-Stage Axial-Flow Compressor Off-Design　　　　　　　　　　LEW-17451

Developed for studying variable geometry effects at the conceptual design level, CMPSTK is a combination of the STGSTK and CMPGEN computer codes. STGSTK predicts multistage axial-flow compressor off-design performance using mean-line stage stacking, and CMPGEN estimates design-speed flow range and efficiency ratios.
U.S. Release Only

Commercial Modular Aero-Propulsion System Simulation (C-MAPSS)　　　　LEW-18315

Note: Software Restricted by Export Control
Written in a combination of MATLAB and Simulink, C-MAPSS provides a realistic simulation of a large commercial turbofan engine. The technology includes a number of graphical user-interface screens that allow point-and-click operation.
U.S. Release Only

Commercial Modular Aero-Propulsion System Simulation (C-MAPSS), Version 2　　LEW-18315

Note: Software Restricted by Export Control
Version 2 of C-MAPSS provides a transient simulation of a large commercial turbofan engine with a realistic engine control system. Written in a combination of MATLAB and Simulink, the software supports easy access to health, control, and engine parameters through a graphical user interface. Retaining the convenience and user-friendliness of the original, Version 2 includes three actuators (as compared to one) and offers an improved controller as well as added actuator and sensor dynamics.
U.S. Release Only

Commercial Modular Aero-Propulsion System Simulation 40k (C-MAPSS40k)　　LEW-18624-1

Note: Software Restricted by Export Control
Developed in the MATLAB/Simulink environment, C-MAPSS40k is a high-fidelity transient simulation of a generic commercial turbofan engine with a 40,000-pound thrust. The nonlinear physics-based component-level model operates up to Mach 0.8 over a wide ambient temperature range and executes faster than real time. The model can be run from the command line or by using a graphical user interface.

Compressible Flow Toolbox　　　　　　　　　　　　　　　　　　　　　LEW-17898

The Compressible Flow Toolbox is a set of algorithms that solve classical compressible equations for isentropic flow, fanno flow, Rayleigh flow, normal shock, oblique shock, and expansion. Implemented in the MATLAB programming language, the technology can be used in the analysis of one-dimensional steady flow with constant entropy, with friction, with heat transfer, or with supersonic Mach numbers.
U.S. Release Only

Computational Fluid Dynamics (CFD) Seal Analysis Code　　　　　　　　LEW-16582

This technology is a computer program designed for the study of fluid dynamic forces.
U.S. Release Only

Computed Tomography Cylinder Unwrapper/Re-slicer Software (CT-CURS), Version 2   LEW-19031-1

CT-CURS is a dedicated unwrapping/re-slicing software tool for computing tomography data from cylindrical and partially cylindrical structures. The technology can be used as a complement to vendor software or can be utilized as a completely standalone visualization program.
U.S. Release Only

Controller Code   LEW-17293

Written in C++, this technology is a comprehensive controller for magnetically supported vertical rotors.
U.S. Release Only

CORBASec   LEW-17214

This technology has been used for distributed aerospace propulsion simulations.
U.S. Release Only

Cryogen Storage Integrated Model (CryoSIM)   MFS-33071-1

CryoSIM provides input power and dry mass estimates for insulation and hardware used in in-space applications to maintain cryogens in storage. System heat load estimations and associated propellant loss masses can also be generated.
U.S. Government Purpose Release

Propellant Feed System Analytical Tool (PFSAT)   MSC-25181-1

The PFSAT parametric analytical tool predicts heat leaks into cryogenic propellant distribution lines. The technology can also be used to determine the optimum orifice diameter for an optional thermodynamic vent system.
U.S. Government Purpose Release

CSPAN Axial-Flow Compressor Conceptual Design Code   LEW-16074

This span-line analysis technology uses isentropic simple radial equilibrium to determine a flow path.
U.S. Government Purpose Release

Extended Testability Analysis (ETA) Tool   LEW-18795-1

ETA extends the analysis capabilities of Qualtech Systems' Testability Engineering and Maintenance System (TEAMS), a technology that enables a user to qualitatively model and analyze fault propagation.
U.S. Release Only

FModel6 Redesigned Solid Rocket Motor (RSRM) Steady-State and Tail-off Transient Dispersions Algorithm   MSC-25204-1

This Fortran 77 mathematical algorithm has been used to model steady-state and tail-off RSRM characteristics.
U.S. Government Purpose Release

Gaseous Nitrogen (GN2) Orifice Mass-Flow Calculator   MSC-24873-1

This calculator has been used to determine GN2 high-pressure tank-source depletion rates for the Space Shuttle Orbiter Water Spray Boiler (WSB), and it has also been used to gauge the ability of GN2 consumables to support APU lubrication cooling during entry.
U.S. Government Purpose Release

Liquid Oxygen (LO2) De-tanking Pressure Surge Prediction Program   MSC-25207-1

This technology defines the LO2 feed system and ground system pressure surges that result from de-tanking into a reverted tail service mast (TSM). The software can simulate a Main Propulsion System (MPS) LO2 inboard fill and drain valve; ground helium supply; and/or anti-geyser helium supply.
U.S. Government Purpose Release

Main Propulsion System (MPS) Liquid Oxygen (LO2)/POGO Suppression Feed System Pressure Surge Prediction Program   MSC-25206-1

This model defined pressure surges generated by the LO2 feed system during Space Shuttle Maine Engine (SSME) startup and shutdown operations.
U.S. Government Purpose Release

ML_POGO Stability Analysis Software   MFS-33024-1

This technology models the coupled structural/propulsion (pogo) stability of a liquid-propellant rocket.
U.S. Release Only

Model5 Reusable Solid Rocket Motor (RSRM) Ignition Model   MSC-25205-1

This program has been used to: (1) generate realistic random pairs of RSRM ignition transients and (2) provide thrust-differential and pressure-rise rate envelopes.
U.S. Government Purpose Release

Modular Aero-Propulsion System Simulation (MAPSS)   LEW-17674

MAPSS is a flexible turbofan engine simulation environment that provides easy access to health, control, and engine parameters through a graphical user interface. The technology can be used as a simulation environment for developing and testing advanced control algorithms, or it can run transient simulations or generate state-space linear models for creating a piecewise linear controller.
U.S. Release Only

Morpheus Engine Geometry Calibration Using Image Processing and Parameter Estimation   MSC-25500-1

This novel video-image processing application calibrates the geometry of a thrust-vector-controlled engine. For offline calibration, Morpheus will read a video taken from an iPhone camera; for offline calibration, the software will read a video from a Webcam.
General Public Release

Propellant Slosh Analysis for the Solar Dynamics Observatory (SDO)   GSC-15118-1

This software tool provides an equivalent mechanical model that approximates fluid slosh effects by analogy to the movements of a point-mass pendulum, which is an important component for simulating propellant slosh dynamics as part of an entire attitude determination and control system.
U.S. Government Purpose Release

SNAP, Version 2.3   LEW-17816

SNAP is an N-body high-fidelity propagation program that can model the trajectories of the planets, the Sun, and virtually any natural satellite in the solar system.
U.S. Release Only

Snewt Software for Hypersonic Aerodynamics Estimation   MSC-24812-1

This engineering tool estimates hypersonic aerodynamic coefficients and pressures on the surface of a vehicle traveling at speeds above Mach 5. The software requires the user to supply a computer model of the vehicle's outer mold as well as free-stream parameters including vehicle orientation and Mach number. A substantial improvement over other available programs, Snewt easily generates a computer representation of the vehicle being studied, eliminates little-used solution options, and utilizes an updated version of the Fortran computer language.
U.S. Government Purpose Release

Space Shuttle Main Engine (SSME) & Main Propulsion System (MPS)
Liquid Hydrogen (LH2) Feed System Pressure Transient Shutdown Model   MSC-25208-1

An integrated multi-node fluid thermodynamic model that incorporates both Orbiter hardware characteristics and SSME characteristics, this technology predicts LH2 system pressures including engine feed line pressure and LH2 manifold pressure.
U.S. Government Purpose Release

Spacecraft Materials Selector (SMS) Expert System   MFS-31328-1

Applicable to select spacecraft, SMS is a preliminary design tool that estimates environmental exposures and/or materials performance.
U.S. Release Only

STAN5   LEW-13009

This computer program computes general two-dimensional turbulent boundary-layer flow using finite difference techniques. Without requiring any modifications to the program code, STAN 5 can handle a wide range of boundary-layer problems. The technology has been used extensively at Stanford University.
U.S. Release Only

TURBAN Turbomachine Design Code   LEW-17454

TURBAN analysis is performed at the arithmetic mean diameter. The stage velocity diagrams are either all similar (therefore have the same work factor) or are determined from an input stage work split. All stages have the same stator exit angle. Stage-by-stage tailoring of the velocity diagrams is not allowed.
U.S. Release Only

V072 Rotor Wake/Stator Interaction Noise Prediction   LEW-17065

The V072 computer code predicts noise from rotor wake/stator interactions. The technology can perform compressor rotor wake prediction only, rotor/stator or fan/FEGV interaction only, fan/core stator interaction only, and both fan/FEGV and fan/core stator interactions.
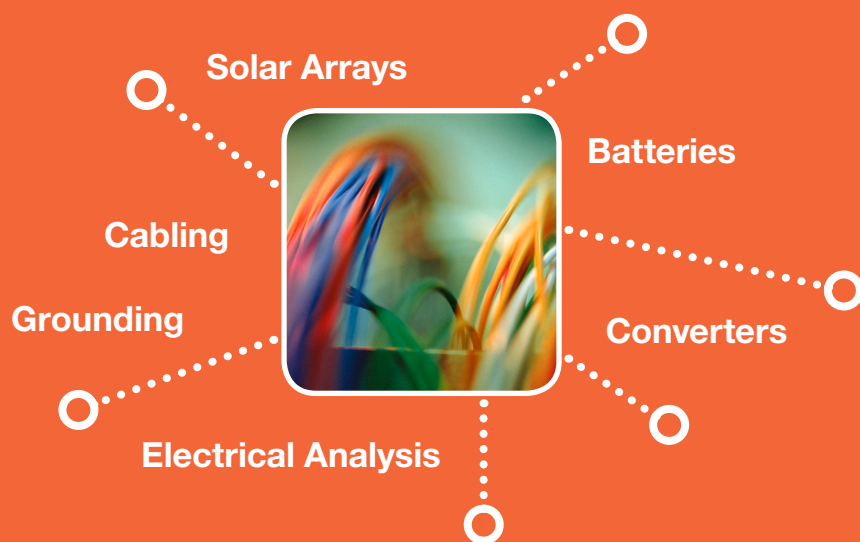**U.S. Release Only**

WOBBLE   LEW-17325

This technology computes the tone noise associated with propellers and predicts axial and circumferential directivity. The acoustic model is exact and accounts for all unsteady sources.
U.S. Release Only

6

Electronics and Electrical Power

Solar Arrays

Batteries

Cabling

Grounding

Converters

Electrical Analysis

Automated Safe-to-Mate (ASTM) Software GSC-15180-1

The Automated Safe-to-Mate Software allows for fast, safe, and reliable check-out testing of connector interfaces for both critical flight hardware and companion ground support equipment (GSE). The tool can check an entire connector or even multiple connectors at one time, retaining electronic records that can be saved for later review.
U.S. Government Purpose Release

International Space Station (ISS) Power Planning and Analysis Tool (PLATO) MSC-24669-1

PLATO is a preflight and real-time analysis software that combines existing and new power resource planning tools into a single application. The software reduces the number of personnel required to manage International Space Station (ISS) electrical power systems by enabling a PHALCON specialist to generate all short-term, flight-specific, and long-range power planning products.
U.S. Government Purpose Release

Packet to Electrical Ground Support Equipment (EGSE) Interface Converter, Version 4.0 GSC-16586-1

Developed using platform-independent language, this interface converter packet allows already-existing EGSE equipment to be supported on Windows and UNIX operating systems. The software is set up and controlled using XML-formatted files that define interface connections and data content.
U.S. Government Purpose Release

Photonic Switching Devices Using Light Bullets ARC-14057-1

This unique, ultra-fast, all-optical switching device is made with readily available, relatively inexpensive, highly nonlinear photonic glasses that offer sufficiently negative group-velocity dispersion and a high, nonlinear index of refraction. The tool's practical use of light bullets helps prevent degeneration at the front and back of pulses.
U.S. Government Purpose Release

Physics-Model-Based Wiring Fault Detection Toolbox for MATLAB ARC-17046-1

Providing a toolbox of functionality for MATLAB, this NASA-developed software detects precursor wiring faults (e.g., chafing) in shielded impedance-controlled cabling using measurements from off-the-shelf, time-domain reflectometry or vector-network analyzer hardware. The technology combines high-fidelity analytical physics models for signal propagation with fast Bayesian inference algorithms for intrinsic cable and fault-parameter retrieval. For more information, please visit: <http://ti.arc.nasa.gov/project/wiring/>
Open Source

Power Quality Impedance Tester Software MSC-25353-1

The Power Quality Impedance Tester Software and the Frequency-Response Analyzer (FRA) combined deliver a complete frequency-response measurement system. The software runs on any personal computer using Microsoft Windows XP/2007. Data, displayed on a graphical user interface, can be saved to a text file.
U.S. Government Purpose Release

SOLAR—A Rapid International Space Station (ISS) Power Availability Simulator MSC-24623-1

SOLAR is a Java-based tool that leverages commercial off-the-shelf software (Satellite Toolkit) and an existing ISS electrical power system model (SPEED) to rapidly perform thousands of power availability simulations.
U.S. Government Purpose Release

Two-Stage, Direct-Current (DC) Superconducting Quantum Interference Device (SQUID) Amplifier System   GSC-14863-1
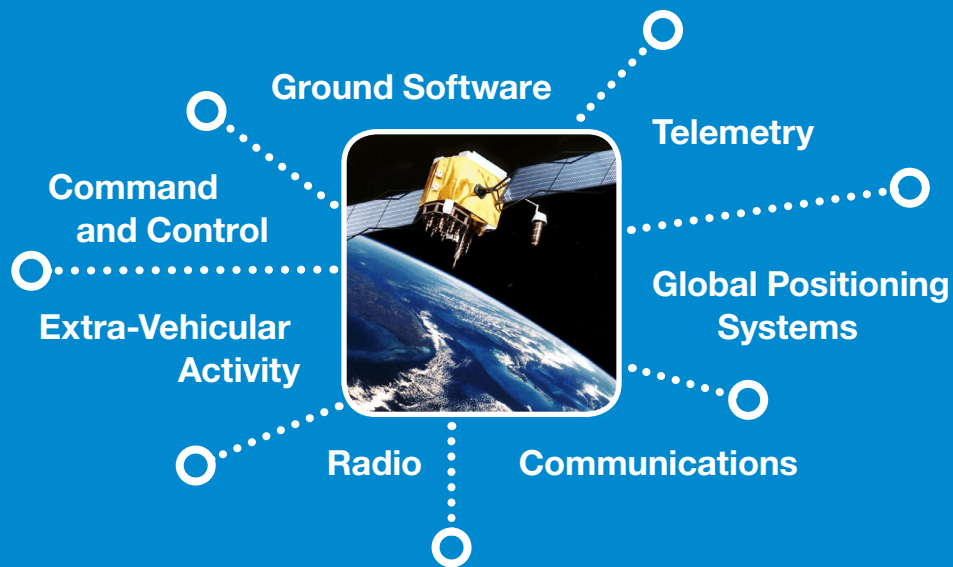
Designed for cryogenic detector-readout applications, this integrated amplifier system consists of two input SQUID and two output-array designs. Niobium shield assemblies for the amplifiers are based on a modular chip package design and help to enhance mechanical robustness and reduce sensitivity to microphonics. Programmable feedback loop electronics offer the user a considerable degree of flexibility and greatly simplify operation.

U.S. Government Purpose Release

7

Operations

Ground Software

Telemetry

Command
and Control

Global Positioning
Systems

Extra-Vehicular
Activity

Radio   Communications

Advanced Spacecraft Integration and System Test Software (ASIST) Front-End Data Systems/Digital History Data Store Software (FEDS/DHDS)　　　GSC-14446-1

This spacecraft ground system can be configured in a variety of ways and used for box-level development and testing, satellite integration and testing, and post-launch mission operations. The technology utilizes a single, industry-standard protocol to ease integration with other products, and it employs commercial off-the-shelf, government off-the-shelf, and public domain software to form a single, cohesive system.
U.S. Government Purpose Release

Advanced Spacecraft Integration and System Test Software (ASIST), Front-End Data Systems/Digital History Data Store Software (FEDS/DHDS), Updated　　　GSC-15832-1

From component development to integration, testing, and mission operations, this NASA technology provides a single spacecraft ground system for processing spacecraft telemetry and command data throughout the lifecycle of a program. The technology is applicable to all missions with telemetry that (1) conforms to the AOS recommendations of the Consultative Committee for Space Data Systems (CCSDS) and (2) meets CCSDS telecommand standards.
U.S. Government Purpose Release

Advanced Technology Microwave Sounder (ATMS) Antenna Beam Analysis Software　　　GSC-16784-1

The ATMS software calculates instrument beam pointing and polarization state. Input is taken in the native MI Technologies MI-3000 antenna measurements system database format and should include sets of azimuth/elevation RF radiation pattern cuts (at multiple phi rotations) or discrete frequencies.
U.S. Government Purpose Release

Altimeter Noise, Electromagnetic Bias (EMB), and Associated Software　　　GSC-14664-1

This NASA software analyzes radar altimeter data to assess instrument performance. The technology estimates noise on range measurements, estimates corrections for electromagnetic bias (EMB), and performs statistical analysis of a variety of parameters.
U.S. Release Only

Automated 3D Damaged Cavity Model Builder for Lower Surface Acreage Tile on Orbiter　　　MSC-25177-1

This quick, accurate, automated technology has been used to perform 3D thermal analysis of damaged lower surface acreage tiles/structures beneath damaged locations on the Space Shuttle Orbiter. The tool's 3D model builder creates both TRASYS geometric math models and SINDA thermal math models to simulate an idealized damaged cavity.
U.S. Government Purpose Release

Autonomous eXplorer Control System (AXCS)　　　ARC-16721-1

AXCS enables smartphones and other mobile devices to be utilized as a ground-based test bed for operations in extreme environments. For NASA, the technology is currently being used to evaluate hardware for balloon launches. The software's tool kits provide environmental and situational measurements, command and data handing (CD&H) functions, events timing, data logging, and communications with external devices. AXCS can be downloaded at: <https://github.com/cboshuizen/AXCS>
Open Source

Autonomous Precision Landing Navigation (APLNav) System　　　MSC-24721-1

The APLNav system provides a simple, cost-effective, reliable, and proven optical terrain navigation tool for planetary landing applications. Passive optical digital cameras are used to create surface images that are rendered against a digital elevation model. The system is derived from the digital scene-mapping and area correlation navigation method that has been employed by cruise missiles for decades.
U.S. Government Purpose Release

Bit-Wise Parallel Algorithms for Correlation in a Real-Time Software Radio Receiver   GSC-14703-1

This efficient, general-purpose microprocessor uses correlation algorithms to receive multiple code-division access signals. By using pseudo-random number codes and eliminating the need for a specially designed correlator chip, the tool offers improved flexibility when compared to previous technologies.
U.S. Government Purpose Release

CalSimHydro   JPL-48235

This Web-based, Google Earth-enabled interactive interface provides a tool for configuring, running, viewing, and downloading the results of a CalSim 3.0 Hydrology Preprocessor program. The software allows the user to (1) interact with a map of water budget areas (WBAs) and display data for a selected WBA in tabular form or as a time series plot; (2) edit input and run a CalSim 3.0 Hydrology Preprocessor; and (3) compare results with base-run output and download the output file. CalSimHydro will be delivered to the California Department of Water Resource (DWR) and released as a part of the CalSim 3.0 system.
U.S. Government Purpose Release

CodeIt Software   GSC-14742-1

The simple, flexible CodeIt Software provides test patterns usable in the development and verification of spacecraft telemetry components, spacecraft telemetry systems, and ground support equipment. Data encoding schemes include Reed Solomon Encoding and Convolutional Encoding.
U.S. Release Only

Command, Control, Communications, and Intelligence (C3I) Delay/Disruption-Tolerant (DTN) Networking Software   LEW-18493

This code is a DTN implementation of the Constellation Program's C3I software.
U.S. Government Purpose Release

Command, Control, Communications, and Intelligence (C3I) Networking Software   LEW-18494

This implementation of the Constellation Program's C3I software has provided an environment for the prototype testing of a variety of networking protocols.
U.S. Government Purpose Release

Command, Control, Communications, and Intelligence (C3I) Voice Exchange Software   LEW-18495

This implementation of the Constellation Program's C3I software has provided an environment for the prototype testing of a variety of voice exchange components.
U.S. Government Purpose Release

Consultative Committee for Space Data Systems (CCSDS) File Delivery Protocol (CFDP) Software Library, Version 3.1   GSC-14993-1

This library provides for the reliable transfer of large data blocks to and from spacecraft. It implements the international standard CFDP protocol, can be used from mission to mission, and supports both ground and flight software,
U.S. Government Purpose Release

Core Command and Data Handling (CC&DH) Component   GSC-15087-1

Note: ITAR-Sensitive Code
Helping to establish an instrument application development foundation for the James Webb Space Telescope (JWST) project, the Core Command and Data Handling (CC&DH) flight software is based on a layered architecture. The technology routes packets (commands, telemetry, and events) to and from a flight application and helps provide for generic flight computer health/safety, telemetry checking, and autonomous operation.
U.S. Government Purpose Release

7. Operations

Core Command and Data Handling (CC&DH) Library   GSC-15197-1

Containing no source code, this library is a binary, executable release of the Core Command and Data Handling (CC&DH) Component.
U.S. Government Purpose Release

DagVoice Multicast, Multichannel Desktop Voice Communication System   ARC-16241-1

Based on the Voice-Over Internet Protocol (VoIP), this desktop voice communication application is capable of connecting up to fourteen voice channels simultaneously in either listening mode (half duplex) or transmission mode (full duplex). Serving as a multicast, multichannel voice soft switch, the technology allows a user to communicate with all other users who are connected to the same voice channels. The system can be deployed over local area networks and wide area networks.
U.S. Government Purpose Release

Debris Examination Using Ballistic and Radar-Integrated Software (DEBRIS)   MSC-24827-1

DEBRIS provides the rapid and accurate C-band/X-band radar analysis to assess debris-related threats posed to ongoing missions. Jointly developed by Johnson Space Center (JSC) and the United States Air Force (USAF), the system is composed of two applications: the primary DEBRIS tool, which observes the initial 150 seconds of a flight, and the Automated Radar Debris Examination Tool (ARDENT), which observes the flight time segment between 150 and 480 seconds.
U.S. Government Purpose Release

DF Library (DFLIB), Version 1.X   MSC-25683-1

The DF Library (DFLIB) is a collection of software application programming interfaces (APIs) that provide convenience-function capabilities unique to a mission control center (MCC). These APIs allow the conversion of the DDD:HH:MM:SS time format to/from a floating point number; provide an X Windows pop-up message generator and an X Windows file-selection interface; and include ISP computation interface functions and macros.
U.S. Government Purpose Release

Distributed Guidance and Control System for Satellite Constellations   GSC-14990-1

This satellite constellation control system minimizes the energy used for maneuvers.
U.S. Government Purpose Release

Flexible Docking Tool for Real-Time, Planning Missions   MSC-24801-1

This flexible software tool improves rendezvous planning for a vehicle visiting the International Space Station (ISS). Features include a telemetry processing function, a relative motion function, a targeting function, a vector view, and two- and three-dimensional graphics. The technology's modeling capability ensures that a vehicle stays within desired coordinates.
U.S. Government Purpose Release

Flight Dynamics Planning and Analysis (FDPA) Subsystem Software   MSC-24638-1

The FDPA subsystem's data pre-processing, flight simulation and analysis, and data post-processing capabilities have enabled accurate operations assessments of the International Space Station and the Space Shuttle. Assessments are performed in a sequential manner using graphical user interface menus and name-list statements to define required input and desired output.
U.S. Government Purpose Release

Global Positioning System (GPS) Enhanced Onboard Navigation System (GEONS) GSC-14687-1

GEONS processes data from standard GPS receivers, communication equipment, and/or attitude sensors to produce accurate, absolute, relative onboard navigation solutions in real time. Navigation products from GEONS support additional autonomous functions, including onboard maneuver control, science viewing, and relative navigation for formation keeping.
U.S. Government Purpose Release

Global Positioning System (GPS) Enhanced Orbit-Determination Experiment (GEODE) GSC-14354-1

The GEODE development effort consisted of providing reliable navigation products from available Space Products Platform 2000 data and delivering prototype boards for inclusion in the Guidance, Navigation, and Control Center's Formation Flying Test Bed (FFTB).
U.S. Government Purpose Release

Global Positioning System (GPS) Receiver Analysis Tool (RAT) MSC-24649-1

RAT reads telemetry information from a GPS receiver and determines the receiver's performance. As a telemetry-input file is read, an analyst can see the plotted satellites and telemetry information change in animated form. The analyst can halt the animation and generate high-quality PostScript images of the plot suitable for importing into post-flight reports.
U.S. Government Purpose Release

Global Positioning System (GPS) Satellite Geometry Analysis Tool (GPSGEM) MSC-24625-1

GPSGEM evaluates satellite geometry for a given Earth-fixed location or trajectory, provides a listing of all GPS satellites in view, and extrapolates a vehicle's trajectory even if two satellites are removed. The tool's navigation controllers offer insight into expected GPS constellation performance and assess implications for the ascent abort and entry phases of a flight. With GPSGEM output, analysts can determine if GPS constellation geometry is robust enough to support vehicle GPS receiver state solutions and/or accurate enough for a safe landing even if one or two satellites fail.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture GSC-15142-1

From development through operations, the GMSEC Architecture provides a secure, scalable, extensible ground and flight system for existing and future missions. The technology enables quick and easy integration of functional mission-unique components. Standardized messaging provides communication among applications.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture, Revision 2 GSC-15577-1

Revision 2 of the GMSEC Architecture incorporates a variety of enhancements and improvements to the original version. From development through operations, the technology provides a secure, scalable, extensible ground and flight system for existing and future missions. Standardized messaging provides communication among applications.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Revised GSC-15576-1

The GMSEC API provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The technology normalizes middleware behavior and supports multiple platforms and languages.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Version 2.5 — GSC-15696-1

Version 2.5 of the GMSEC API includes several enhancements to the original. The technology provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The API normalizes middleware behavior and supports multiple platforms and languages.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Version 2.6 — GSC-15778-1

Version 2.6 of the GMSEC API enhances and improves earlier implementations. The technology provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The API normalizes middleware behavior and supports multiple platforms and languages.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Architecture Application Programming Interface (API), Version 3.2 — GSC-16207-1

Providing mechanisms to manage cyber-attack risks, the security extension included in Version 3.2 of the GMSEC API offers message-level information confidentiality and integrity. The technology provides access to standard middleware messaging capabilities (e.g., publish, subscribe, request, reply). The API normalizes middleware behavior and supports multiple platforms and languages.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Alert Notification System Router (ANSR) — GSC-15592-1

The Alert Notification System Router (ANSR) is a software application that provides user notifications through paging and email. Page directives can contain text and/or attachments and can be sent to paging devices via the WCTP protocol, to email devices via the SMTP protocol, and to SMS devices via third-party email-to-SMS gateways. ANSR provides page escalation and tracking, offers a built-in redundancy capability, and interacts with other applications through GMSEC interfaces. The technology has been approved for use in operational environments.
U.S. Government Purpose Release

Alert Notification System Router (ANSR), Version 3.9.3 — GSC-16518-1

Version 3.9.3 of the ANSR implements three bug fixes. The software application provides user notifications through paging and email. Page directives can contain text and/or attachments and can be sent to paging devices via the WCTP protocol, to email devices via the SMTP protocol, and to SMS devices via third-party email-to-SMS gateways. ANSR provides page escalation and tracking, offers a built-in redundancy capability, and interacts with other applications through GMSEC interfaces. The technology has been approved for use in operational environments.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Compliance Test Suite — GSC-16074-1

The Compliance Test Suite includes both message publisher and message validator applications. The publisher feature provides a variety of predefined, displayable, and selectable messages. The validator reads a selected message and validates it against a corresponding XML schema. Detailed warnings and errors can be accessed with a double click on any specific message.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Criteria Action Table (CAT)   GSC-15531-1

Increasing system reliability and reducing operations costs, CAT is an expert system that takes action based on GMSEC messages. Using autonomic computing techniques and providing a table for rule entry and action definition, the technology can manage the increasingly complex actions and automation of a satellite ground system. At the same time, CAT is generic enough to control any domain or environment that uses a message bus similar to the one used in the GMSEC.
U.S. Government Purpose Release

**Goddard Mission Services Evolution Center (GMSEC)
Criteria Action Table (CAT), Version 5.0**   GSC-15611-1

Using its publish/subscribe capabilities, Version 5.0 of the Criteria Action Table implements a client/server architecture that communicates over the GMSEC bus.

Increasing system reliability and reducing operations costs, CAT is an expert system that takes action based on GMSEC messages. Using autonomic computing techniques and providing a table for rule entry and action definition, the technology can manage the increasingly complex actions and automation of a satellite ground system. At the same time, CAT is generic enough to control any domain or environment that uses a message bus similar to the one used in the GMSEC.
U.S. Government Purpose Release

**Goddard Mission Services Evolution Center (GMSEC)
Criteria Action Table (CAT), Version 5.4.1**   GSC-16853-1

Ported over customized-heartbeat-destination code from GREAT Event Analyzer 2.14, this version of the Criteria Action Table permits external monitor attribute strings to be substituted for unevaluated internal attribute strings.

Increasing system reliability and reducing operations costs, CAT is an expert system that takes action based on GMSEC messages. Using autonomic computing techniques and providing a table for rule entry and action definition, the technology can manage the increasingly complex actions and automation of a satellite ground system. At the same time, CAT is generic enough to control any domain or environment that uses a message bus similar to the one used in the GMSEC.
U.S. Government Purpose Release

**Goddard Mission Services Evolution Center (GMSEC)
Environmental Diagnostic Analysis Tool (GEDAT)**   GSC-15529-1

GEDAT offers single-point, centralized visual representation of GMSEC-architected systems to allow users to identify and diagnose problems, failures, and errors quickly and efficiently. The tool provides status at a glance and delivers audible and visual alerts to signal various critical conditions as they occur.
U.S. Government Purpose Release

**Goddard Mission Services Evolution Center (GMSEC)
Environmental Diagnostic Analysis Tool (GEDAT), Version 1.1**   GSC-15848-1

Version 1.1 is an update to the original GEDAT tool. The technology displays numerous network components residing on one or more GMSEC buses; each component performs message-based communications using the publish/subscribe model.

GEDAT offers single-point, centralized visual representation of GMSEC-architected systems to allow users to identify and diagnose problems, failures, and errors quickly and efficiently. The tool provides status at a glance and delivers audible and visual alerts to signal various critical conditions as they occur.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC)
Environmental Diagnostic Analysis Tool (GEDAT), Version 2.0   GSC-16276-1

Version 2.0 of GEDAT features: a new tree-table display with selective filtering to support large-scale environments; added displays for CPU, memory, network resource graphing/plotting, server configuration, and message statistics; filtered search capabilities; improved menu-bar navigation capabilities; automatic elevation of errors or critical events; and user-configurable notification timeout monitoring.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Message Bus (MB)   GSC-15141-1

Providing an alternative to costly commercial solutions, this user-configurable, easy-to-install middleware implementation supports all GMSEC Architecture and application interface messaging capabilities. NASA has used the technology during the development, testing, and integration of GMSEC-compliant components.
Open Source

Goddard Mission Services Evolution Center (GMSEC) Message Bus (MB), Revision 2   GSC-15575-1

This technology offers a variety of enhancements to the original GMSEC Message Bus. Providing an alternative to costly commercial solutions, the NASA-developed user-configurable, easy-to-install middleware implementation supports all GMSEC Architecture and application interface messaging capabilities. NASA has used the technology during the development, testing, and integration of GMSEC-compliant components.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Parameter Display Tool   GSC-16073-1

This technology is a GMSEC-compliant software component that enables users to create and view a display page consisting of parameter and telemetry mnemonic values. Both text and color are used to delineate status.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC)
Remote Application Service Provider (GRASP)   GSC-16172-1

The GRASP application connects to the GMSEC bus, operating behind a firewall in a secured environment. The technology filters GMSEC messages based on subject and sends permitted messages to their destinations outside the control center. Both transmission protocol and encryption are configurable.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC)
Reusable Events Analysis Toolkit (GREAT)   GSC-15530-1

GREAT is a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, the technology greatly increases the operational value of system event logs and provides for increased operational efficiency.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC)
Reusable Events Analysis Toolkit (GREAT), Version 1.8   GSC-16224-1

Version 1.8 of GREAT enables FOTs to monitor current mission-system status remotely.

The technology consists of a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, GREAT significantly increases the operational value of system event logs.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT), Version 1.8 (Enhanced) GSC-16581-1

The enhanced 1.8 version of GREAT enables Event Analyzer and Event Archive to support Oracle.

The technology consists of a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, GREAT significantly increases the operational value of system event logs.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Reusable Events Analysis Toolkit (GREAT), Version 2.3 GSC-16851-1

Version 2.3 of GREAT enables users to (1) archive real-time messages for multiple databases in parallel and (2) still be able to retrieve/display historical messages from a single database.

The technology consists of a flexible and highly portable set of tools for mission operations analysis that utilizes information found in system-event messages. By adhering to the concepts and standards of the GMSEC architecture, GREAT significantly increases the operational value of system event logs.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Scalable Integrated Multi-Mission Support System (SIMSS) Simulator, Release 2.0 GSC-16039-1

This technology allows SIMSS to accept GMSEC-standard messages via the GMSEC message bus service.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) SystemAgent GSC-15585-1

Utilizing a middleware-based architecture, this software provides computer host-agent health information to other GMSEC components. The technology will also execute directive commands received through GMSEC and monitor specified log files.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) SystemAgent, Version 2.0 GSC-15747-1

Version 2.0 of SystemAgent will obtain the following network resource information from a message/middle-ware server (i.e., TIBCO SmartSocket): network port bandwidths in Kbps, the number of bytes sent/received over the port, and the number of messages sent/received over the port.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) Trending Analysis and Plotting System (TAPS), Version 6.5 GSC-15842-1

While the prototype TAPS system does not process and store telemetry data, it will request data from a server, generate trending products, and send requested products over an information bus using GMSEC messages.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center (GMSEC) VCR GSC-15589-1

This software will record all GMSEC-published/received messages (or a subset of those messages) and play them back at the same rate.
U.S. Government Purpose Release

GNSS-Inferred Positioning System and Orbit Analysis Simulation Software (GIPSY-OASIS) JPL-19636

GIPSY-OASIS is widely used for geophysical and global positioning system research.
U.S. Government Purpose Release

Hazardous Command List (HCL) Database Software   MSC-24799-1

This innovative tool tracks and manages the International Space Station (ISS) Hazardous Command List (HCL) and associated restricted commands and hazard reports.
U.S. Government Purpose Release

Integrated Test and Operating System (ITOS)   GSC-14012-1

The ITOS is a generic software system for controlling spacecraft and spacecraft components during development, testing, and operation in orbit. Inexpensive, portable, and highly configurable, the system runs under a variety of UNIX operating systems (e.g., Solaris, FreeBSD, and Linux) on workstations or personal computers.
U.S. Government Purpose Release

Integrated Test and Operations System (ITOS) Modifications   GSC-14806-1

A major update to the original system, this modification archives, displays, and analyzes telemetry; sends telecommands; and executes user-defined procedures for controlling tests and operations.
U.S. Government Purpose Release

Integrated Test and Operations System (ITOS), Release 7.3   GSC-15090-1

This modification incorporates new enhancements and updates to the Integrated Test and Operations System.
U.S. Government Purpose Release

Integrated Test and Operations System (ITOS), Release 8   GSC-16025-1

This ITOS modification features a new-events system that includes tools to allow the user to create old-style log files and manage the log database.
U.S. Government Purpose Release

Integrated Trending and Plotting System (ITPS)   GSC-15532-1

ITPS is a comprehensive trending and plotting tool for the storage, extraction, and analysis of spacecraft housekeeping telemetry data.
U.S. Government Purpose Release

Integrated View (IView), Version 1.1.2   MSC-25625-1

The Integrated Viewer (IView) is a Web-based electronic tool used to execute Onboard Short-Term Plan Viewer (OSTPV) activities. The software serves as a consolidated user interface, integrating information from OSTPV, the International Procedure Viewer (IPV), and the Automated Stowage Note (ASN) tool.
U.S. Government Purpose Release

International Procedure Viewer (IPV), Version 3.1   MSC-25612-1

This Web-based viewer offers a suite of tools to create electronic procedures, maintain libraries, and provide a backup viewing capability for standalone clients. IPV utilizes XML-formatted documents to display procedures and allows connectivity to the Automated Stowage Note (ASN) and the European Space Agency Portable Work Station Laptop Application.
U.S. Government Purpose Release

Interoperable Remote Component (IRC)   GSC-14308-1

IRC provides robust interactive and distributed control/monitoring of remote instruments. The IRC architecture combines the processing capabilities of Java with the power of XML to express hierarchical data in a human-readable, platform-independent format. For additional information, please visit: <http://opensource.gsfc.nasa.gov/projects/IRC/index.php>
Open Source

Java Application Shell (JAS) GSC-14769-1

The JAS core program framework allows any Java 2 interactive application to be built as a set of plug-ins. The tool reduces development and testing time and greatly enhances code reuse.
U.S. Government Purpose Release

Java Astrodynamics Toolkit (JAT) GSC-14912-1

The Java Astrodynamics Toolkit (JAT) is a collection of Java components that aid flight dynamics engineers in performing space mission design; trajectory optimization; and spacecraft navigation, attitude-determination, and control systems analysis. Current capabilities include orbit propagation, orbit determination, maneuver planning, spacecraft attitude simulation, and 3D orbit and attitude visualization.
Open Source

Joint-Execution Package Development and Integration (JEDI) Application MSC-25099-1

JEDI is the primary tool used by all International Space Station control centers to create and approve messages for astronauts and flight control teams. JEDI messaging enables ground and crew personnel to update specific tasks or procedures quickly and efficiently.
U.S. Government Purpose Release

Lightwire GSC-14759-1

Lightwire is a passive retro-modulated communications tool that reduces data rates. The system transmits a carrier beam to a reflector that modulates the infinite carrier and returns the beam back.
U.S. Government Purpose Release

Maestro Science Activity Planner for Mars JPL-45871

The Maestro Science Activity Planner (Maestro) provides an intuitive interface to the Mars Exploration Rovers Mission, combining cutting-edge visualization with sophisticated planning and simulation capabilities.
U.S. Government Purpose Release

Method for Automatic Optimization of Yaw Maneuvers for Orbiting Space Vehicles MSC-25656-1

This software provides a simplified analytical solution for yaw maneuver optimization. The approach is applicable to the International Station (ISS) as well as other orbiting space vehicles.
U.S. Government Purpose Release

Mission Display (MDX) System JPL-35238

The Mission Display (MDX) System can be used to visualize a wide variety of raster scan data, including IFSAR images and DEM. The technology enables the user to view very large data sets (greater than 2 gigabytes per image) and offers several ways to combine information from different data sets into a single display window.
U.S. Government Purpose Release

Modeling-Error-Driven Performance-Seeking Direct Adaptive Control ARC-16235-1

This software uses a novel, stable, discrete, time-adaptive law that implements flight control to target damages/modeling errors in a direct adaptive-control framework. The baseline controller uses dynamic inversion with proportional integral augmentation. This methodology will investigate conditions for stability as well as performance.
U.S. Government Purpose Release

Modular Integrated Solution Toolkit (MIST) GSC-15337-1

The Modular Integrated Solutions Toolkit (MIST) is a software system designed to provide low- and medium-fidelity simulation of spacecraft telemetry and commands for ground system testing. The technology consists of a simulation architecture, simulation middleware, a user interface, and a library of functional elements.
U.S. Government Purpose Release

MSK View, Version 2 (aka MSK Win)　　　　　　　　　　　　　　MSC-25544-1

Flight controllers in Johnson Space Center's Mission Control Center use multiple tools to display and monitor real-time telemetry data. MSK View V2 offers a complete redesign of the original software, which could only use one data source and only operate in the UNIX/Linux environment.
U.S. Government Purpose Release

Multi-Purpose Attitude and Pointing System (MAPS), Version 7.1　　　　MSC-25522-1

The Multipurpose Attitude and Pointing System (MAPS) has been used for attitude development and line-of-sight analysis since 1991. Version 7.1 of the software allows the user to model any motion-control system without post-processing or manually modifying data.
U.S. Government Purpose Release

NASA Caution and Warning Tool for International Space Station (ISS) Partners　　　MSC-24697-1

Making it easier to communicate and coordinate evaluation and resolution activities, this software enables industry partners to receive the same caution and warning (C&W) data displays that ISS flight control teams receive. The technology allows all parties to consult from the same perspective. Status information is communicated to subscribers via XML message transmissions.
U.S. Government Purpose Release

Orbital Communications Adaptor (OCA) Management System (OCAMS)　　　MSC-24833-1

OCAMS is a simulation-to-implementation, multi-agent system-development methodology that combines ethnography, participatory design, multi-agent simulation, and agent-based systems integration.

Employing the Brahms programming language, the technology automates tasks, leverages network infrastructure to distribute information, and links arbitrary hardware and software systems to teams of people on Earth and in space.
U.S. Government Purpose Release

Planning Products Change Request (PPCR) Application　　　　　　　MSC-24807-1

For the International Space Station (ISS) mission plan, this comprehensive change-request management tool offers built-in workflow processes to track condition-related information and thousands of tasks and activities. The technology allows planners to view a summary of all of the changes for any one mission day, even though the changes may have been received via multiple PPCRs and from various other flight controllers and disciplines.
U.S. Government Purpose Release

Plots, Calculations, and Graphics Tools (PCG2)　　　　　　　　　MSC-25593-1

This firing-room and office application software is used to monitor vehicle and launch systems.
U.S. Government Purpose Release

Portable Waveform Transceiver (PVVT)　　　　　　　　　　　　MSC-24794-1

The core component of a software-defined radio, the PVVT is an FPGA or ASIC implementation of a fully configurable transceiver that maps data bits into baseband symbols and demaps baseband symbols into data bits. Governed by input parameters and coefficients that determine specific modes, data processing is accomplished by a fixed chain of concatenated operators.
U.S. Government Purpose Release

Positional Login (POSLOGIN)　　　　　　　　　　　　　　　MSC-25483-1

In the Mission Control Center at Johnson Space Center, the operational support of International Space Station missions requires around-the-clock monitoring by flight controllers and support staff. POSLOGIN has been developed to ensure that processes remain in place and continue to be executed during shift changes.
U.S. Government Purpose Release

ROBUS-2 Fault-Tolerant Broadcast Communication System for Modular Avionics   LAR-17264-1

ROBUS-2 is a time-division, multiple-access broadcast communication system that uses a time-indexed communication schedule for medium-access control. The technology provides guaranteed fault-tolerant services that include: message broadcast (Byzantine Agreement), dynamic communication schedule update, time reference (clock synchronization), and distributed diagnosis (group membership).
Open Source

Sasquatch Footprint Predictor   MSC-25513-1

Sasquatch is used to predict flight paths and landing regions (i.e., footprints) to ensure that an aircraft's payload will land in a safe, obstacle-free region of a drop zone.
U.S. Government Purpose Release

Scheduling and Planning Interface for Exploration (SPIFe)   ARC-15795-1A

The SPIFe interface allows plans to be generated under complex constraints and reduces the number of team members necessary to achieve mission goals. The technology, consisting of a set of plugins built using the Java Eclipse Rich Client Platform (RCP), complies with the standards of the Ensemble project. SPIFe software offers several novel controls and visualizations for task planning and a generalized application interface for communicating with planning engines.
U.S. Government Purpose Release

Scheduling, Training Administration and Records (STAR) System   ARC-16336-1

This technology is a next-generation, Web-based training management system for crews, instructors, and flight controllers. Replacing the Training Administration Management System (TAMS), the Flight Operations Curriculum Administration System (FOCAS), and approximately 100 other disparate tools, STAR provides integrated curriculum development and documentation, customized training plans, personnel and facilities scheduling, training event feedback, and other training resources.
U.S. Government Purpose Release

Secure Multi-Channel Optical Communication Module   GSC-14856-1

This optical communications module integrates the following components: a fiber-coupled laser transceiver array using laser-diode sources and GRIN collimator lenses; a dichroic splitter and lenslet array interfaced with a CCD (or CMOS) focal-plane array (used for multiple-beam centroid tracking); a MEMS micro-mirror array (used for multiple transmitter-beam steering and multiple receiver field-of-view selectivity); and an under-filled entrance/exit pupil of a telephoto lens or telescope. The optical technology is supported by adjunct electronics and digital signal-processing functions that enable full-duplex communications with and tracking of multiple sources/terminals.
U.S. Government Purpose Release

Shuttle Electronic Tie-In (SETI)   MSC-25597-1

The Shuttle Electronic Tie-In System (SETI) is a Web-based, database-driven application used for operational communications (e.g., shift tie-ins, log notes, and task/project status).
U.S. Government Purpose Release

Space Link Extension Forward Command Link
Transmission Link (CLTU) Service (User Side)   GSC-15168-1

This software enables the user to (1) transfer command data from a mission control center to a ground station for uplink to a spacecraft and (2) then monitor the processing of each command from the ground station. The technology uses the Space Link Extension (SLE) Forward CLTU Service protocol, which is defined by the Consultative Committee for Space Data Systems (CCSDS).
U.S. Government Purpose Release

Space Link Extension Return Channel Frames (SLE-RCF) Service Software Library (User Side)   GSC-15458-1

This software library enables a mission control center to receive telemetry frames from a ground station. The technology implements the SLE-RCF protocol as defined by the Consultative Committee for Space Data Systems (CCSDS). Software routines can be reused from mission to mission.
U.S. Government Purpose Release

Space Telecommunications Radio System (STRS) Compliance Tools   LEW-18562

These tools aid in ensuring software compliance with the NASA-developed Space Telecommunications Radio System (STRS) architecture. The technologies support waveform application portability and upgradability and avoid the costs and risks associated with using software-defined radios.
U.S. Government Purpose Release

Tracking and Data Relay Satellite (TDRS) Simulator (TSIM)   GSC-16845-1

TSIM provides a ground-based capabilities simulation of the first-generation Tracking and Data Relay Satellite (TDRS).
U.S. Government Purpose Release

Telemetry and Science Data Software System   GSC-15793-1

The Telemetry and Science Data Software System was designed to ease testing verification, assist in debugging system anomalies, and perform both trending data analysis and advanced science analysis.
U.S. Government Purpose Release

Telemetry and Science Data Software System, Updated   GSC-16035-1

The Telemetry and Science Data Software System was designed to ease testing verification, assist in debugging system anomalies, and provide both trending data analysis and advanced science analysis.
U.S. Government Purpose Release

Visiting Vehicle Ground Trajectory Tool   MSC-24763-1

This targeting tool provided the ability to perform planning and real-time operations for the visiting International Space Station (ISS) vehicle group.
U.S. Government Purpose Release

8

Structures and Mechanisms

Structural Loading Analysis and Design

Deployables

AESOP-STAB Ablation Modeling and Optimization Program, Version 3.1   MSC-25566-1

To help maximize payload capability, AESOP-STAB determines the minimum weight of an n-layer thermal protection system (TPS) material subject to temperature constraints. Originally developed in the 1970s, code modifications include enhanced environment input options, solution routines, and material response capabilities. To use the program, the user must define the thermal model, select the desired optimization procedure(s), define all thermo-physical properties for each material, and provide the desired boundary conditions (i.e., heating rates and back wall conditions). AESOP-STAB was designed to make the preparation of input data as simple as possible.
U.S. Government Purpose Release

Beyond Low-Earth Orbit (LEO) Architecture Sizing Tool (BLAST)   MSC-25505-1

A user-friendly, configurable spacecraft sizing tool, BLAST provides a shareable, re-creatable and rigorous end-to-end multi-element architecture framework that has been used to generate mass data for in-space, beyond low-Earth orbit (LEO) transportation vehicles and architectures. Offering a novel approach to modeling, BLAST couples extensive MER research with the ability to assess mission changes instantaneously by analyzing sensitivity sweeps of several parameters at once.
U.S. Government Purpose Release

Cylinder Optimization of Rings, Skin, and Stringer (CORSS)   MFS-31025-1

Cylinder Optimization of Rings, Skin, and Stringer, or CORSS, is an automated, interactive method to obtain a minimum-weight preliminary design.
U.S. Release Only

Data Transfer Between Dissimilar Meshes (DTBDM, 2.0)   LAR-16371-1

Designed to automate an otherwise labor-intensive process, DTBDM puts the aerodynamic loads output of a computational fluid dynamics (CFD) package into the structural model of an aircraft to allow for deflection calculations.
U.S. Release Only

Development and Evaluation of an Order-N Formulation for Multi-Flexible Body Space Systems   MSC-25539-1

This NASA-developed tool is a generic, recursive order-N algorithm for systems with rigid or flexible bodies, in tree- or closed-loop topology, with N being the number of bodies of the system.
U.S. Government Purpose Release

Half-Cycle Crack Growth   DRC-010-044

This NASA-developed software program predicts the operational flight life of critical aero-structural components. The tool offers a reliable method for calculating theoretical fatigue crack growths that could lead to catastrophic structural component failures. The program builds upon and integrates Armstrong's proven half-cycle and closed-form aging theories and is especially accurate because it considers every half-cycle of loading spectra for specific structural components. The program works by reading test data files and determining maximum and minimum loads of each half-cycle of random loading spectra in order to calculate theoretical crack growth. The innovation is an improvement on traditional prediction software (and in particular on visual inspections) because it considers mini-amplitude stress loading and half-cycles based on the duty cycle of a particular component or structure.
U.S. Release Only

HCDstruct   LAR-18313-1

This MATLAB routine generates a scalable finite element model suitable for hybrid wing-body (HWB) structural analysis and optimization. HWB geometry structure is based on a vehicle sketch-pad (VSP) surface model of an aircraft and a FLOPS-compatible parameterization of the center body and wing structure. Optimization and weight calculation are based on a Nastran finite element analysis of the primary structural components.
U.S. Release Only

Piping Stress Analysis Software   KSC-11692-1

The Piping Stress Analysis Software calculates the stress, working pressure, or required pipe-wall thickness for a given application in a simple, straightforward manner. The program allows the user to select a specific material from a database of commonly used materials or to create a customized database for an unlisted material. Pipes can be analyzed according to several sets of requirements, including the ASME/ANSI B31.1 and B31.3 piping codes and the JIC hydraulics code. Both standard and SI metric versions are available.
U.S. Release Only

Planetary Balloon Design Software   GSC-15112-1

Planetary Balloon is an algorithm for sizing lobed balloons in any generalized environment on any planet. By including the effects of circular lobes with load tapes, skin mass, and hoop stress in the lobed bulges, the NASA-developed tool determines an accurate balloon shape of practical construction, including the room-temperature cut pattern for the gore shape.
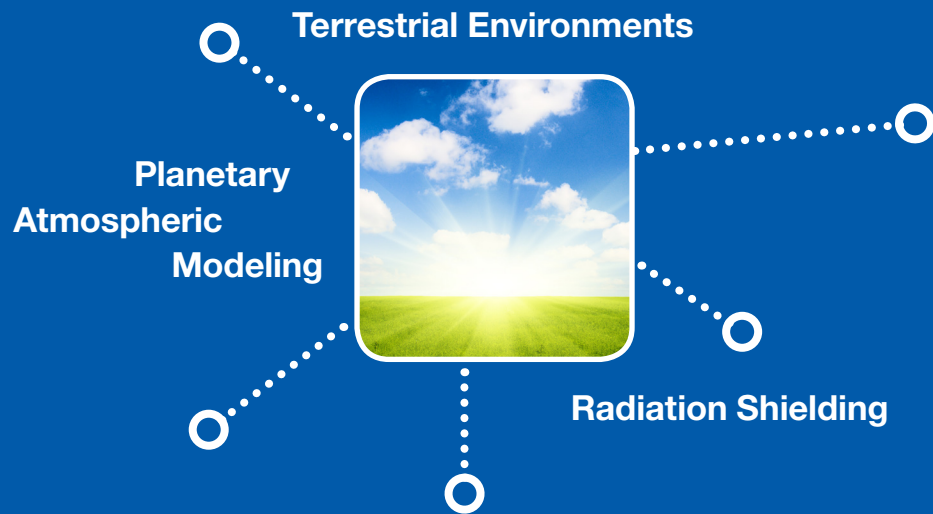**U.S. Government Purpose Release**

Trajectory Software Application Deorbit Opportunities Processors (TSA/DOPS)   MSC-24639-1

Originally developed for the Space Shuttle and the International Space Station, TSA/DOPS allows multiple users to collaborate in the design and development of spacecraft deorbit opportunities. Once key parameters and variables have been entered, software algorithms generate useful information regarding sun-angle violations and ascending nodes.
U.S. Government Purpose Release

9

Environmental Science
(Earth, Air, Space, Exoplanet)

Terrestrial Environments

Planetary Atmospheric Modeling

Radiation Shielding

3D Visualization Software for Mission Science Operations (Viz)　　　ARC-14933-1

The Viz package provides situational awareness, science analysis, and data understanding capabilities for planetary exploration mission science operations. Affording a modular and extensible visualization environment, the technology couples network and plug-in interfaces with a 3D scene graph database and an interactive 3D viewer.

U.S. Government Purpose Release

Active-Response Gravity Offload System (ARGOS Horizontal Software)　　　MSC-25394-1

ARGOS provides a simulated environment to test robotic systems and humans in reduced gravity, including microgravity and lunar and Martian environments. Generation 1 of the technology repurposed a commercial off-the-shelf load management system as a proof of concept. Generation 2 utilizes a fully custom design with expanded system capabilities for speed and load capacity.

U.S. Government Purpose Release

Advanced Land Image Assessment System (ALIAS)　　　GSC-15185-1

ALIAS supports radiometric and geometric multispectral image processing for the Advanced Land Imager (ALI) instrument onboard NASA's Earth Observing-1 (EO-1) satellite. The radiometric subsystem character-izes and (where possible) corrects: detector operability; gain; bias; coherent, impulse, and random noise; signal-to-noise ratios; saturation levels; striping and banding; and the stability of detector performance. Geometric processing functions support sensor alignment calibrations; sensor chip assembly alignments; modulation transfer function characterizations; image-to-image characterizations; and geodetic accuracy assessments. Please visit the following URL for more information: <http://opensource.gsfc.nasa.gov/projects/Alias/index.php>

Open Source

AutoChem　　　GSC-14862-1

AutoChem is a suite of programs that can be used as an automatic-code-generation symbolic differentiator and analysis/documentation tool for atmospheric chemical modeling and data assimilation. Written in Fortran 90, the technology is flexible, adaptable, and has been employed in a wide variety of kinetic applications. AutoChem is also applicable to combustion modeling, metabolism modeling, and interstellar chemistry.

U.S. Release Only

BUMPER Micrometeoroid and Orbital Debris Risk Assessment Tool, Version 3.0　　　MSC-25474-1

BUMPER is the primary risk analysis program used by NASA to provide safe and reliable operation of spacecraft exposed to the impacts of micrometeoroid/orbital debris (MMOD). BUMPER 3.0 is a major update to BUMPER-II released in the early 1990s.

U.S. Government Purpose Release

Contamination Mass Transport Analysis Software　　　GSC-15193-1

This software package models molecular contamination transport from outgassing and propulsion systems; contaminant backscatter from the orbital environment; and particle redistribution during launch and on-orbit operations.

U.S. Government Purpose Release

Data Validation User Interface (DVUI)　　　GSC-15097-1

DVUI is a navigation/discovery client on the Earth Observing System Clearinghouse (ECHO). The technology enables scientists to search, visualize, and order data tools necessary for validating Moderate-Resolution Imaging Spectroradiometer (MODIS) land products.

U.S. Government Purpose Release

DocBUILDERsolo
GSC-15149-1

DocBUILDERsolo is a Java desktop application that allows users to create Earth science metadata. Providing both online and offline work environments, the technology offers portability, customization, and versatility. Key features include a visual checklist to indicate completeness; multiple document support; built-in coordination of keyword lists; a built-in spell checker; and optional writing templates.
U.S. Release Only

Earth Global Reference Atmospheric Model (Earth-Gram)
MFS-31462-1

The Earth Global Reference Atmospheric Model (GRAM) provides geographical and altitude coverage for each month of the year. For altitudes up to 27 kilometers, GRAM uses either Global Upper Air Climatic Atlas (binary) or Global Gridded Upper Air Statistics (ASCII) CD-ROM data sets. The model includes water vapor and 11 other atmospheric constituents. Versions from 1999, 2007, and 2010 are available. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Earth Global Reference Atmospheric Model (Earth-Gram) 2007
MFS-32582-1

Earth-GRAM 2007 provides estimates of means and standard deviations for atmospheric parameters such as density, temperature, winds, and constituents for any month and at any altitude and location within the Earth's atmosphere. Earth-GRAM can also provide profiles of statistically realistic variations for any of these parameters. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Earth Global Reference Atmospheric Model (Earth-Gram) 2010
MFS-32780-1

Earth-Gram 2010 is an open-source Fortran computer code that can run on a variety of platforms including PCs and UNIX stations. The model provides values for atmospheric parameters such as density, temperature, winds, and constituents for any month and at any altitude and location within the Earth's atmosphere. Versions from 1999 and 2007 are also available. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Electric Propulsion Interactions Code (EPIC)
MFS-32165-1

EPIC is an interactive computer toolset that enables the construction of a 3D spacecraft model and the assessment of a variety of interactions between the model's subsystems and the plume from an electric thruster. EPIC unites different computer tools to address the many complexities associated with spacecraft/plume interaction processes. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

ElectroStatic Return of Contaminants Tool
MFS-31315-1

The ElectroStatic Return of Contaminants Tool is a first-generation computational code that computes the return characteristics of spacecraft-generated contaminants, including Debye sheath (if necessary), the returned contaminant mass rate, returned mass flux, returned mass ratio, return velocity, and surface sputter (where applicable). To assist the user, default values have been supplied for all program inputs. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

ElectroStatic Return of Contaminants Tool (Updated)　　　　　MFS-32011-1

The ElectroStatic Return of Contaminants tool is a first-generation computational code created for the purpose of computing the return characteristics of spacecraft-generated contaminants. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Flood Dashboard　　　　　GSC-16275-1

This technology aggregates SensorWeb-enabled airborne, ground sensor, and model data related to floods.
U.S. Government Purpose Release

General EQFlux　　　　　GSC-14791-1

The WindowsEQFlux computer program converts solar-cell damage resulting from hard-particle radiation into the equivalent fluence on MeV electrons. Please visit the following URL for more information: <http://opensource.gsfc.nasa.gov/projects/eqflux/index.php>
Open Source

General Mission Analysis Tool (GMAT), Revision 2012a　　　　　GSC-16565-1

GMAT is a software system for mission analysis and trajectory optimization, estimation, and prediction. The technology can be used to design spacecraft trajectories, optimize maneuvers, perform orbit determination, visualize and communicate mission parameters, and understand a mission's trade space. Please visit the following URL for more information: <http://open.nasa.gov/blog/2012/06/12/general-mission-analysis-tool/>
Open Source

GeoCam, Version 2　　　　　ARC-16088-1A

GeoCam is a geospatial system for disaster response that consists of (1) low-cost consumer hardware (i.e., a digital camera or cell phone, position/orientation sensors, and an optional embedded controller) and (2) a Web-based workflow that enables images and other geo-referenced data to be shared and viewed in a variety of ways. GeoCam includes software that computes image location and provides for geo-rectification, KML-formatted geospatial data generation, image management, and geo-referenced data sharing. Please visit the following URL to download the technology: <http://github.com/geocam>
Open Source

GEOS2WRF and MERRA2WRF Processing Tools　　　　　GSC-16065-1

GEOS2WRF and MERRA2WRF are data preprocessing tools for the Weather Research and Forecasting (WRF) limited-area weather model.
U.S. Government Purpose Release

GEOS-5 Global Change Master Modeling Software　　　　　GSC-15354-1

GEOS-5 is a next-generation circulation model. Developed using the Earth System Modeling Framework (ESMF) for its internal architecture, the technology represents a new paradigm for systems development. Please visit the following URL for more information: <http://opensource.gsfc.nasa.gov/projects/GEOS-5/>
Open Source

Global Change Master Directory's MD9 Distributed Java-Based Directory Search Software System　　　　　GSC-14999-1

Version 9 of the Global Change Master Directory (GCMD) is a Java-based software system used to provide Earth science data and services. The MD9 software provides a three-tiered, object-oriented architecture that affords lightweight clients access through remote method invocation (RMI).
U.S. Government Purpose Release

Global Precipitation Measurement (GPM) Operational Simulator (GO-SIM) Core   GSC-16262-1

GO-SIM core provides a software-only simulator capability for executing GPM systems. The technology loads and runs different versions of spacecraft flight software, integrates with the Wind River workbench, and executes faster than real time.
U.S. Government Purpose Release

Global Precipitation Measurement (GPM) Operational Simulator (GO-SIM) Instrument Simulations   GSC-16264-1

These software-only science instrument simulations satisfy the GPM bus controller and allow flight software to operate as it would under normal conditions.
U.S. Government Purpose Release

Global Precipitation Space and Ground Radar Comparison Software   GSC-15469-1

Designed to support a prototype validation network for the Global Precipitation Measurement (GPM) space-flight mission, this space and ground radar comparison software collects data from the Precipitation Radar instrument flying on the Tropical Rainfall Measuring Mission (TRMM) spacecraft. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/GPM/>
Open Source

Google Earth Offline Cache Pre-Loader (GEOCP), Version 1   ARC-16089-1

GEOCP enables disaster responders to utilize Google Earth quickly in the field, where Internet connectivity may be sporadic or even unavailable. Please visit the following URL to download the technology: <http://ti.arc.nasa.gov/m/groups/intelligent-robotics/geocp.zip>
Open Source

HDFView Plugin   GSC-14948-1

This Java-language software plug-in to HDFView provides an interface for two versions of hierarchical data formats (HDF 4 and HDF 5). Please visit the following URL for more information: <http://opensource.gsfc.nasa.gov/projects/HDF/index.php>
Open Source

Improvements to Regional-Global Seismic Tomography   MSC-24816-1

This effort modified an existing set of software-processing codes used in seismic tomography. Enhancements include the incorporation of an Iterative Reweighted Least Squares (IRLS) strategy and the addition of forward and derivative calculations for seismic depth phases.
U.S. Government Purpose Release

Integrated Space Weather Analysis (iSWA) System   GSC-16291-1

This Web-based dissemination system for NASA-relevant space weather information combines forecasts based on the most advanced space weather models and concurrent space environment information.
U.S. Government Purpose Release

Interactive Spacecraft Charging Handbook With Integrated, Updated Spacecraft Charging Models (ISCCH), Version 3.1   MFS-31675-1

The ISCCH is an interactive, Web-based multimedia product that offers updated and integrated spacecraft charging models. The software guides the non-expert using the power of sophisticated analysis tools. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

9. Environmental Science (Earth, Air, Space, Exoplanet)

International Polar Orbiter Processing Package (IPOPP)　　　GSC-15570-1

IPOPP is the primary software package that enables the direct-readout community to process, visualize, and evaluate Earth science data from the Aqua and Terra missions. The technology will also be used in the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) and related missions. Please visit the following URL for more information: <http://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=165&type=software>
Open Source

Invasive Species Forecasting System (ISFS) Applications/QuickMap　　　GSC-15761-1

QuickMap is a simple OS X drag-and-drop application that automates an ISFS model run. Input consists of presence/absence point location data in the form of a text file. Output includes a diagnostic report that provides statistical details about the model and its resulting predictive surface.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Architecture and Operation　　　GSC-15767-1

This technology supports the ISFS canonical modeling workflow, a set of sequential atomic steps necessary for computing a predictive spatial model.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Command Interpreter (iShell)　　　GSC-15765-1

This iShell technology is a command interpreter and script host that provides a traditional user interface to ISFS Core Services for UNIX and UNIX-like systems.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Core Services (iCore)　　　GSC-15764-1

These file-conversion programs implement the ISFS canonical modeling workflow.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Framework　　　GSC-15766-1

These programs, data, utilities, and documentation are required to create and run tailored site- and user-specific ISFS applications. By providing a skeleton for the software components common to all ISFS tools, the technology enables developers to build customized applications more quickly and at lower costs.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Predictors/GSENM　　　GSC-15763-1

ISFS Predictors are site-specific environmental, remote sensing, and related data sets used as independent, covariate predictor variables in ISFS model runs.
U.S. Release Only

Invasive Species Forecasting System (ISFS) Programs/SWLR　　　GSC-15762-1

These statistical routines participate in the processing chain of ISFS Core Services.
U.S. Release Only

Investigation of Helioseismic Waves and Magnetic Variations Associated With Solar Flares　　　GSC-14694-1

Using SOHO/MDI, YOHKOH, and RHESSI data, this project utilized the analysis of magnetic field variations to investigate energy release and transport in solar flares.
U.S. Government Purpose Release

James Webb Space Telescope (JWST) Wavefront Sensing Software
GSC-15399-1

This software package implements an image-based phase-retrieval algorithm. Using a variable number of irradiance measurements collected in defocused planes as input, the software is capable of determining optical wavefront information. In addition to the JWST, the technology is applicable to other segmented telescope systems.

U.S. Government Purpose Release

Joint Force Operational Readiness Combat Effectiveness Simulation (JFORCES)
MSC-25614-1

This software development effort implemented the functionality of the Active Debris Removal System Architecture Analysis Tool (ADR SAAT) on top of the JFORCES integrated framework.

U.S. Government Purpose Release

J-Track 3D Satellite Tracking Application
MFS-32013-1

J-Track 3D is a projection that displays numerous satellites in orbit around the Earth. The technology provides a set of Java components integrated with Web pages, back-end processes, and an SQL database and scripts to provide a suite of satellite tracking services. Features include optional ground trace and orbit trace. An interactive Web page can be found at: <http://science.nasa.gov/realtime/jtrack/3d/JTrack3D.html/>

U.S. Release Only

Kepler Community Data Analysis Tools
ARC-16805-1

The Kepler archive contains time-series data calibrated and reduced from detector pixels. The pipelined reduction includes the removal of time-series trends systematic to a spacecraft and its environment. Software tools can be downloaded at: <http://keplergo.arc.nasa.gov/PyKE.shtml>

Open Source

Land Information System (LIS) Software, Version 6.1
GSC-16290-1

LIS can be used (1) as a problem-solving environment for hydrologic research to enable accurate global water- and energy-cycle predictions, or (2) as a decision support system to generate useful information for disaster, water resource, and agricultural management; numerical weather prediction; and air quality and military mobility assessment. Extensible interfaces allow the incorporation of new domains, land surface parameters, meteorological inputs, data assimilation, and optimization algorithms. Please visit the following URL for more information: <http://lis.gsfc.nasa.gov/>

U.S. Government Purpose Release

Land Information System (LIS) Verification Toolkit (LVT)
GSC-16017-1

LVT a high-resolution land surface modeling and data assimilation system that enables the evaluation, analysis, and comparison of outputs generated by the Land Information System (LIS).

U.S. Government Purpose Release

LEO-to-GEO Environment Debris Model (LEGEND)
MSC-24805-1

LEGEND is a three-dimensional orbital debris evolutionary model capable of simulating the historical and future debris populations in the near-Earth environment.

U.S. Government Purpose Release

LidarVis, Version 1.0
ARC-15569-1

LidarVis is a software program for visualizing distribution data collected from lidar. The technology provides advanced query capabilities that enable scientists to locate characteristic-specific distributions.

U.S. Government Purpose Release

Living With A Star: Space Environment Test Beds (LWS-SET) Carrier Simulator — GSC-14907-1

This technology simulates the data interfaces between the SET carrier and experimenters. Flag encoding and decoding capabilities are included for transmitted or received data. CRC error checking encoding and decoding capabilities are also included. The software connects to other programs over serial port connections.
U.S. Government Purpose Release

Low-Altitude Trapped Radiation Model, Version 1 — MFS-31309-1

Accurate models of the Earth's trapped energetic proton environment are required for both piloted and robotic space missions. As astronomical and remote sensing detectors become more sensitive, proton flux can induce unwanted backgrounds in the instrumentation. The Low-Altitude Trapped Radiation Model, based on nearly 20 years of data from the TIRO/NOAA weather satellites, predicts the integral omindirectional proton flux in three energy ranges: >16, >36, and >80 MeV. The model contains a true solar cycle variation and accounts for the secular variation in the Earth's magnetic field. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Lunar e-Library — MFS-32430-1

The Lunar e-Library database provides an accessible, searchable set of technical references on the lunar environment, lunar studies, and past lunar missions including Apollo/Saturn. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Magnetogram Forecast (Mag4) — MFS-32802-1

Forecasting from a magnetogram of a sunspot active region, this algorithm predicts solar eruptions anticipated within the next 24 to 48 hours. The technology essentially transforms available solar scientific data into forecasting tools for severe space weather conditions.
U.S. Release Only

Mars Global Reference Atmospheric Model (Mars-GRAM) 2010 — MFS-33158-1

Mars-GRAM is an engineering-level atmospheric model widely used for diverse mission applications, including systems design, performance analysis, and operations planning for aerobraking, entry descent and landing, and aerocapture. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
General Public Release

MATLAB-Based Solar System Ephemeris Toolbox — KSC-12544

This set of MATLAB functions has been used to generate state data (position and velocity) for the Sun, the Earth's moon, and all of the other planets in the solar system. Provided by the Jet Propulsion Laboratory's Solar System Dynamics Group, the technology uses Chebychev polynomial fits of numerical integration results for solar system motion. Essentially, the toolbox functions as the MATLAB equivalent of JPL Fortran routines used to construct binary ephemeris files, verify correct installation, and generate state data.
General Public Release

Mercator—Virtual Planetary Analysis Environment for NASA Science Missions — ARC-16434-1

Mercator is a virtual planetary analysis environment for NASA science missions. The technology provides visualization, interrogation, fusion, comparison, simulation, and mining of multi-dimensional, multi-resolution data products from remote and in-situ planetary field science.
U.S. and Foreign Release

Meteoroid Engineering Model (MEM), Version 1.0 — MFS-32205-1

The MEM model can be used to describe the meteoroid environment anywhere in the inner solar system. Incorporating a physics-based approach rather than traditional empirical fits, the model provides important information necessary for spacecraft survivability, including meteoroid directionality and velocity distributions. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

NASA Forecast Model Web (NFMW) Map Service — GSC-15276-1

NFMW reads weather forecast models outputs; subsets the data to the region of interest; interpolates the data to the specified size; generates a visualization of the data using colors, contour lines, or arrows; and sends the visualization to the client. More information can be found at: <http://opensource.gsfc.nasa.gov/projects/NFMW/>
Open Source

NASA Marshall Engineering Thermosphere (MET) Model 2007 — MFS-33038-1

MET-2007 consists of a computer program and subroutines. For altitude ranges up to 2,500 kilometers, the technology provides information on atmospheric properties as a function of latitude, longitude, time, solar flux, and geomagnetic indices. The model outputs the following parameters: exospheric temperature, local temperature, atmosphere constituent number densities, average molecular weight, total mass density, and total pressure. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

NASA Unified Weather Research and Forecasting (WRF) — GSC-16234-1

At NASA, WRF is being used to study: the precipitation processes associated with several high-impact weather events; aerosol impact on the area climate and water cycles over monsoon regions; the influence of land surface heterogeneity and soil moisture gradients on land-atmosphere interactions; explicit simulations of hurricanes; and interactive chemistry-aerosol processes.
U.S. Government Purpose Release

NASA World Wind Java (WWJ) Software Development Kit (SDK) and Web Mapping Services (WMS) Server — ARC-15166-1A

NASA World Wind is an intuitive software application supporting the interactive exploration of a variety of data presented within a geospatial context. The technology offers a 3D graphics user experience with seamless, integrated access to a variety of online data sources via open-standards protocols. Please visit the following URL for additional information: <http://worldwind.arc.nasa.gov/java/>
Open Source

NASA/Air Force Spacecraft Charging Analyzer Program (NASCAP-2K), Version 4.1 — MFS-32056-1

NASCAP-2K is the next-generation spacecraft charging analysis code. The technology is a comprehensive update to the original NASCAP spacecraft charging codes written twenty years ago. A collaboration of NASA and the U.S. Air Force Research Lab (AFRL), the software builds upon the Air Force's DynaPAC charging algorithms and will replace 3D spacecraft charging codes for all environments. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

9. Environmental Science (Earth, Air, Space, Exoplanet)

Neo-Geography Toolkit (NGT), Version 2 — ARC-16341-1A

NGT is a collection of automated processing tools that can transform raw geospatial raster data from remote sensing instruments into useful cartographic products, including visible image base maps and topographic models. The technology can be downloaded at the following URL: <https://github.com/neogeographytoolkit/stereopipeline>

Open Source

Neptune Global Reference Atmospheric Model (Neptune-GRAM), Version 1.0 — MFS-32296-1

From surface to orbital altitudes, this Fortran-based program provides engineering estimates of density, temperature, pressure, and winds for the Neptune atmosphere. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>

U.S. Release Only

Obs4MIPS — GSC-16848-1

This technology is a front end to the Climate Model Output Rewriter (CMOR2) software package. The technology converts a variety of standard data formats (e.g., netcdf3, netcdf4, Grads control files, and MATLAB data files) to allow publication on the Earth System Grid Federation (ESGF) data node.

U.S. Release Only

Ocean Processing Software For NASA's Moderate Resolution Imaging Spectrometer (MODIS) Combined Ocean Color — GSC-14518-1

These software programs process MODIS Level 1B satellite data and retrieve geophysically important measurements of the world's oceans. The programs use EOS toolkit support routines and HDF-EOS file structures and are written in C and Fortran 90.

U.S. Release Only

Orbital Debris Engineering Model (ORDEM), Version 3 — MSC-25457-1

ORDEM offers flux as a function of debris size and year. The technology can be operated in spacecraft mode or telescope mode. An upgraded user interface uses project-oriented organization and provides graphical representations of numerous output data products.

General Public Release

PolyMap/NetView — GSC-14771-1

The PolyMap/NetView set of software tools (1) populates and extracts geospatial data from an Oracle database and (2) converts geospatial data between different file formats. New data sets can be created on the fly.

U.S. Government Purpose Release

Portable Airborne Laser System (PALS) — GSC-14906-1

PALS is a small, portable airborne lidar profiling system created using off-the-shelf, commercially available components. The technology is composed of four subsystems: a laptop computer running LabVIEW; a charge-coupled device (CCD) video camera system; a differential global positioning system; and a laser transmitter/receiver.

U.S. Release Only

Radiation Environment Array Charge Transport (REACT) — MFS-32001-1

The REACT detector array charge collection model is useful in the design of optical sensor missions. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>

U.S. Release Only

Real-Time Display of Global Earth Science Data for Informal Education (Earth Today)   GSC-14926-1

Earth Today (ET) is an autonomous exhibit that displays near-real-time satellite data to the public. The technology features attractive visualizations of sea-surface temperature (SST); SST anomalies; GOES IR water vapor, and GOES IR clouds.
U.S. Government Purpose Release

SAIC Algorithm Test Bed for Asteroid Detection (SALTAD), Version 1.5   GSC-16050-1

Composed of a series of C-language models, the SALTAD software package processes multi-frame image data to detect moving asteroids in a star-cluttered background. The software is highly modularized for interfacing with existing near-Earth asteroid search facility software.
U.S. Release Only

Satellite Contamination and Materials Outgassing Knowledgebase (SCMOK), Version 3.0   MFS-32183-1

SCMOK is a combination of the ASTM E1559 and Space QCM flight databases. Approximately 200 contamination/space environmental effects papers/reports are available, including LDEF papers for the three post-retrieval conferences and also papers related to POSA, MIR, and the International Space Station. The information can be accessed and searched using Acrobat. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Sea-Viewing Wide-Field-of-View Sensor (SeaWiFS) Data Analysis (SeaDAS)   GSC-14719-1

SeaDAS is a comprehensive package for processing, displaying, analyzing, and ensuring the quality control of all SeaWiFS data products. The technology also provides processing, display, and analysis capabilities for other satellite sensors, including the Ocean Color and Temperature Sensor (OCTS), the Coastal Zone Color Scanner (CZCS), the Modular Optoelectronic Scanner (MOS), and the Moderate-Resolution Imaging Spectroradiometer (MODIS).
U.S. Government Purpose Release

SensorWeb   GSC-15535-1

This technology enables a network of heterogeneous sensors to work as a cohesive whole. Users can specify a serious of actions, data aggregations, and fusion operations with the details of the implementations hidden.
U.S. Government Purpose Release

SensorWeb Campaign Manager Application Programming Interface (API) With Client   GSC-16059-1

This Java code application enables machine-to-machine access between a client platform and the Campaign Manager application programming interface.
U.S. Government Purpose Release

Service Algorithm Visualization and Networking Tool (SAVANT) for Web Services   GSC-14785-1

The SAVANT graphical tool creates "visual programs" of Web service operations. Users can produce processing flowcharts; drag arrows to connect parameters between operations; and specify processing flow order.
U.S. Government Purpose Release

SHARM—the Software Solving the Monochromatic Radiative Transfer Problem in Planetary Atmospheres Using Spherical Harmonics Method   GSC-14838-1

SHARM has been used to generate look-up tables and develop advanced algorithms of aerosol retrieval and atmospheric correction of Landsat Enhanced Thematic Mapper Plus (ETM+) images.
U.S. Government Purpose Release

9. Environmental Science (Earth, Air, Space, Exoplanet)

Simple Thermal Environment Model (STEM) User's Guide — MFS-31728-1

Helpful in the thermal analysis of near-Earth spacecraft, the STEM User's Guide is a Fortran-based program that provides engineering estimates of top-of-atmosphere albedo and outgoing longwave radiation. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>

U.S. Release Only

Space Physics Data Facility (SPDF) Web Services — GSC-14730-1

These Web services provide a distributed programming interface to a portion of the Space Physics Data Facility (SPDF) software. The technology conforms to all applicable Web service specifications of the World Wide Web Consortium. Please visit the following URL for additional information: <http://spdf.gsfc.nasa.gov/>

Open Source

Space Weather Android App — GSC-16321-1

Developed for the Community Coordinated Modeling Center, this Android application displays space weather information. Users can swipe between space weather data products to see the latest available data; pan and zoom to see a detailed view of any particular product; rearrange and add space weather data products to the application layout; and browse a data catalog by category. Please visit the following URL for more information: <https://play.google.com/store/apps/details?id=gov.nasa.gsfc.iswa.NASASpaceWeather>

U.S. Release Only

Space Weather iPhone App — GSC-16226-1

Developed for the Community Coordinated Modeling Center, this iPhone/iPod touch application displays space weather information. Users can swipe between space weather data products to see the latest available data; pan and zoom to see a detailed view of any particular product; rearrange and add space weather data products to the application layout; and browse a data catalog by category. Please visit the following URL for more information: <https://itunes.apple.com/us/app/nasa-space-weather/id422621403?mt=8>

U.S. Release Only

Spacecraft Docking Simulation — ARC-14598-1

This simulation is a simplified version of the rendezvous and docking scenario performed by Space Shuttle astronauts docking at the International Space Station (ISS).

U.S. and Foreign Release

Spacecraft Materials Selector (SMS) Expert System — MFS-31328-1

The SMS knowledge base is a preliminary design tool that provides estimates of environmental exposures and/or materials performance. Inputs may launch date, altitude, inclination, mission duration, and certain characteristics of satellite motion. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>

U.S. Release Only

Terrestrial Observation and Prediction System (TOPS) — ARC-16197-1

Integrating satellite, aircraft, and ground sensor data with weather/climate models, TOPS produces operational nowcasts and forecasts of ecological conditions. Helping to mitigate potential negative impacts, the technology determines the appropriate socio-economic and resource management approach necessary for handling fluctuations within the biosphere. Please visit the following URL for more information: <http://ecocast.arc.nasa.gov/topwp/>

U.S. Release Only

The Charge Collector (TCC), Version 2.1   MFS-32019-1

TCC is a compilation of spacecraft charging tools including design guidelines and a variety of information from government/industry/academic databases and reports. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Titan Global Reference Atmospheric Model (Titan-GRAM), Version 1.0   MFS-32297-1

Titan-GRAM is a Fortran-based program that provides engineering estimates of density, temperature, pressure, and winds for the Titan atmosphere. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
U.S. Release Only

Thermal Protection System Sizing (TPSSZR) Using Sinda/Fluint   ARC-15016-1

TPSSZR is an automated thermal protection system (TPS) distribution and sizing analysis code for analyzing space vehicles at the conceptual-design level. The technology automatically generates TPS stackups and aerothermal environment files, maintains consistent material properties descriptions, and has the capability to simultaneously evaluate multiple nominal and abort flight trajectories.
U.S. Government Purpose Release

Trapped Proton Model (TPM)   MFS-31329-1

TPM determines the differential omnidirectional proton flux from 1 to 100 MeV. At high altitudes, the model is based on CRRESPRO developed by AFRL; at low altitudes, the model is based on data from the TIROS/NOAA (POES) low-altitude polar-orbiting satellites. The model contains a true solar cycle variation and also contains sub-models for quiet and active magnetospheric states. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
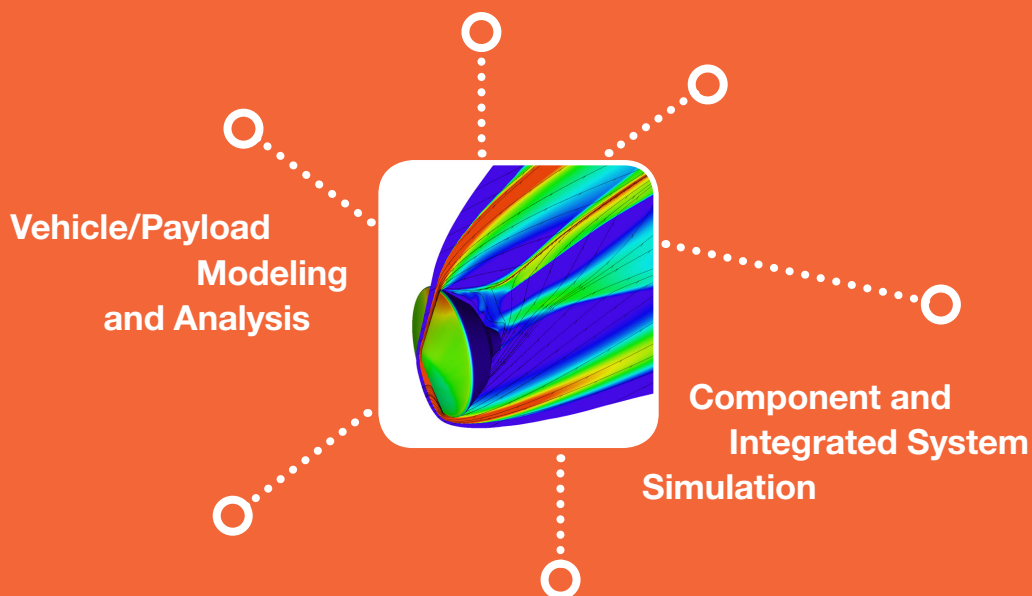**U.S. Release Only**

Venus Global Reference Atmospheric Model (Venus-GRAM) 2005, Version 1.0   MFS-32314-1

Venus-GRAM 2005 is a Fortran-based program that provides engineering estimates of density, temperature, pressure, and winds for the Venus atmosphere. Please visit the following URL for additional information on the Space Environments & Effects (SEE) Program: <http://see.msfc.nasa.gov/>. Release forms for SEE tools may be found at: <http://see.msfc.nasa.gov/ModelDB/ModelDB.html>
General Public Release

10

Design and Integration Tools

Vehicle/Payload Modeling and Analysis

Component and Integrated System Simulation

Advanced Life Support Sizing Analysis Tool (ALSSAT), Version 6.0   MSC-23506-1

The Advanced Life Support Sizing Analysis Tool (ALSSAT) is a computer model for sizing and analyzing designs of environmental-control and life support systems (ECLSS) for spacecraft and surface habitats involved in the exploration of Mars and the Moon. It performs conceptual designs of advanced life support (ALS) subsystems that recycle air and water and process wastes in order to reduce the need for resource resupply. ALSSAT is a means of investigating combinations of such subsystems' technologies and thereby assists in determining the most cost-effective technology combination available. Using the Microsoft Excel spreadsheet software with Visual Basic programming language, ALSSAT has been developed to perform multiple-case trade studies based on the calculated ECLSS mass, volume, power, and Equivalent System Mass, as well as parametric studies by varying the input parameters. ALSSAT's modular format is specifically designed for the ease of future maintenance and upgrades.
U.S. Release Only

Advanced Life Support Sizing Analysis Tool (ALSSAT), Version 11.0   MSC-25210-1

The Advanced Life Support Sizing Analysis Tool (ALSSAT) is a computer model for sizing and analyzing designs of environmental-control and life support systems (ECLSS) for spacecraft and surface habitats involved in the exploration of Mars and the Moon. It performs conceptual designs of advanced life support (ALS) subsystems that recycle air and water and process wastes in order to reduce the need for resource resupply. ALSSAT is a means of investigating combinations of such subsystems' technologies and thereby assists in determining the most cost-effective technology combination available. Using the Microsoft Excel spreadsheet software with Visual Basic programming language, ALSSAT has been developed to perform multiple-case trade studies based on the calculated ECLSS mass, volume, power, and Equivalent System Mass, as well as parametric studies by varying the input parameters. ALSSAT's modular format is specifically designed for the ease of future maintenance and upgrades.
U.S. Release Only

Advanced Life Support Sizing Analysis Tool (ALSSAT), Version 12.0   MSC-25510-1

The Advanced Life Support Sizing Analysis Tool (ALSSAT) is a computer model for sizing and analyzing designs of environmental-control and life support systems (ECLSS) for spacecraft and surface habitats involved in the exploration of Mars and the Moon. It performs conceptual designs of advanced life support (ALS) subsystems that recycle air and water and process wastes in order to reduce the need for resource resupply. ALSSAT is a means of investigating combinations of such subsystems' technologies and thereby assists in determining the most cost-effective technology combination available. Using the Microsoft Excel spreadsheet software with Visual Basic programming language, ALSSAT has been developed to perform multiple-case trade studies based on the calculated ECLSS mass, volume, power, and Equivalent System Mass, as well as parametric studies by varying the input parameters. ALSSAT's modular format is specifically designed for the ease of future maintenance and upgrades.
U.S. Government Purpose Release

Advanced Platform to Integrate Disparate Modeling and Simulation Programs   MSC-24188-1

This simulation software supports the integration of various modeling and simulation programs across a variety of analysis and testing environments. The architecture was designed to support a wide variety of guidance, navigation, and control engineering analyses—including requirements assessments, flight software prototyping, design trades, hardware-in-the-loop testing, and operator-in-the-loop evaluations—for NASA's Crew Exploration Vehicle. A recent re-architecture allows for running multiple flight software (FSW) strings simultaneously.
U.S. Government Purpose Release

Aerospike Design and Performance Tool (ADAPT)　　　　　　　MFS-33098-1

The ADAPT computer code designs and analyzes the performance of linear, annular, or plug-cluster aerospike engines. ADAPT can automatically evaluate aerospike nozzle performance over a wide variation of independent design variables, and it can be used in concert with other built-in analysis techniques to optimize aerospike nozzles over an entire flight envelope. Any propellant system can be modeled. Outputs of the code include files that contain the thruster/spike contour and a summary output file for each thruster/spike design point, as well as vacuum and delivered performance data for the thruster and the entire thruster/spike module. One-dimensional performance data are also included for both the thruster and aerospike so that efficiencies and comparisons may be made.
U.S. Release Only

Aerotherm Charring Material Thermal and Ablation Program (CMA02)　　　MFS-31980-1

The Aerotherm Charring Material Thermal and Ablation Program (CMA02), developed from the public domain CMA87S code, is an implicit, finite-difference computational procedure for computing the one-dimensional transient transport of thermal energy in a three-dimensional isotropic material.
U.S. Release Only

Aerotherm Chemical Equilibrium (ACE)　　　　　　　　　　　　MFS-32300-1

The Aerotherm Chemical Equilibrium (ACE) code was developed for predictive thermal/ablative analysis of rocket nozzle liner materials. The tool offers versatility in calculating quantities of importance to a broad variety of thermochemical processes.
U.S. Release Only

Architecture Adaptive Computing Environment (ACE)　　　　　　　GSC-14911-1

The Architecture Adaptive Computing Environment (ACE) is a parallel computing language, compiler, and runtime library. The purpose of ACE is to allow a programmer to more easily write parallel programs for a wide variety of parallel computer architectures.
Open Source

Automated Mission Planning and Scheduling System (AMPS), Version 2　　GSC-15852-1

Five major components comprise the AMPS solution: (1) a C-language integrated production system (CLIPS) inference engine; (2) a graphical user interface (GUI); (3) a common object request broker architecture (CORBA); (4) a special functions component; and (5) a data component. CLIPS resolves currently active goals and objectives into a plan; a dynamic scheduler algorithm then expands the plan into a full schedule, adjusting it as needed.
U.S. Government Purpose Release

Automated Triangle Geometry Processing for Surface Modeling and Cartesian Grid Generation (Cart3D)　　　　　　　　　　　　ARC-14275-1

Cart3D is a high-fidelity inviscid analysis package for conceptual and preliminary aerodynamic design. It allows users to perform automated computational fluid dynamics (CFD) analysis on complex geometry. The package includes utilities for geometry import, surface modeling and intersection, mesh generation, and flow simulation. Cart3D is highly automated so that geometry acquisition and mesh generation can usually be performed within a matter of minutes on most modern UNIX workstations or PCs.
U.S. Government Purpose Release

Bearing Analysis Tool (BAT)　　　　　　　　　　　　　　　MFS-31864-1

The Bearing Analysis Tool (BAT) allows detailed design of rolling element bearings rocket engine turbopumps and other applications. It includes a graphical user interface that greatly reduces the effort required to define analytical models for simulation and design.
U.S. Release Only

Boundary-Layer Integral-Matrix Procedure (BLIMP)   MFS-23348-1

The Boundary-Layer Integral-Matrix Procedure (BLIMP) software provides fast, highly accurate solutions to gas-phase boundary-layer flow problems encompassing a broad range of boundary conditions. The tool is capable of obtaining accurate and economical solutions to governing differential equations of momentum, energy, and species.

U.S. Government Purpose Release

Brahms: A Multiagent Simulation/Execution Environment for the Brahms Multiagent Language   ARC-15654-1

Brahms is a multiagent programming language for modeling people and systems in a conceptual world. Brahms language gives users the ability to model the behavior of human organization, communication, and teamwork, as well as human-machine interaction.

U.S. Government Purpose Release

BUMPER II   MSC-23774-1

BUMPER II is the primary spacecraft M/OD risk analysis program NASA uses to provide for safe and reliable operations of NASA spacecraft. The code quantifies (1) the probability shielding penetration and the damage to spacecraft equipment as a function of the size, shape, and orientation of the spacecraft; (2) the parameters of its orbit; and (3) the impact damage resistance of each spacecraft. The BUMPER II software was specifically designed for the International Space Station (ISS) and contains several dozen ballistic limit equations that are based on results from thousands of hypervelocity impact tests conducted on ISS shielding.

U.S. Release Only

Campaign Manager (or GeoBPMS)   GSC-16267-1

The Campaign Manager (also known as GeoBPMS) is a type of Workflow Chaining Service (WfCS) that is intended to standardize methods to orchestrate multiple sensors in heterogenous environments. Users can script sensors that reside in various secure domains using an intuitive interface. Campaign Manager can create a customized, low-cost data processing pipeline for sensor tasking, data acquistion, data processing, and distribution.

U.S. Government Purpose Release

Charring Ablator Response (CHAR) Code   MSC-25599-1

The CHarring Ablator Response (CHAR) Code is a 1D, 2D, and 3D ablation, thermal analysis, and porous flow solver primarily used to predict the response of ablative thermal protection systems during atmospheric entry. The software can be executed on serial and massively parallel computing platforms.

U.S. Release Only

Charring Material Ablator (CMA87) Code   MFS-32299-1

The Charring Material Ablator (CMA87) code is a predictive software program that performs thermal and ablative analysis of rocket nozzle liner materials. The software is written in ANSI-standard Fortran 77 and uses standard mathematical functions found in common linkable object libraries on most high-end workstations and/or PC platforms.

U.S. Release Only

CMA92FLO Aerotherm Charring Material Thermal Response Ablating Program   MFS-31355-1

The CMA92FLO Aerotherm Charring Material Thermal Response Ablating Program is an implicit finite-difference computational procedure.

U.S. Release Only

CMA93FLO Aerotherm Charring Material Thermal Response Ablating Program   MFS-31767-1

In this version of the Aerotherm Charring Material Thermal Response Ablating Program, developed for NASA by Aerotherm, a line of code was altered so the program would read input data from a previous file rather than waiting for operator input from an interactive terminal.
U.S. Release Only

Collaborative Spacecraft and Mission Software Design Tool (ATLAS)   ARC-16674-1

ATLAS is a software tool used to do preliminary design studies for spacecraft missions. The software supports a collaborative work environment allowing multiple engineers to work simultaneously on the same design.
U.S. and Foreign Release (Academic)

Computational Fluid Dynamics (CFD) Utility Software Library   ARC-14467-1A

A collection of utility programs and reusable subroutine libraries supports computational fluid dynamics, particularly on multiblock structured grids. The technology is applicable to all flight regimes—subsonic, transonic, supersonic, and hypersonic. The CFD Utility Software Library can be downloaded at:
<http://sourceforge.net/projects/cfdutilities>
Open Source

Computational Fluids Laboratory 3-Dimensional (CFL3D)   LAR-16003-1

CFL3D is a structured-grid, cell-centered, upwind-biased, Reynolds-averaged Navier-Stokes (RANS) code. It can be run in parallel on multiple grid zones with point-matched, patched, overset, or embedded connectivities. Both multigrid and mesh sequencing are available in time-accurate or steady-state modes.
U.S. Release Only

Configuration-Based Aerodynamics (CBAero)   ARC-15819-1

CBAero is a software tool for the prediction of the conceptual aero-thermodynamic environments of aerospace configurations. The vehicle geometry is defined using unstructured, triangulated surface meshes. For subsonic Mach numbers a fast, unstructured, multi-pole panel code is coupled with a streamline tracing formulation to define the viscous surface solution. For supersonic and hypersonic Mach numbers, various independent panel methods are coupled with the streamline tracing formulation, attachment line detection methods, and stagnation-attachment line heating models to define the viscous aero-thermal environment.
U.S. Government Purpose Release

COPERNICUS Generalized Methodology for Designing Spacecraft Trajectories   MSC-24209-1

COPERNICUS provides a single, unified framework for modeling, designing, and optimizing spacecraft trajectories for robotic and human missions. The methodology facilitates modeling and optimization for problems ranging from a single spacecraft orbiting a single celestial body to a mission involving multiple spacecraft and multiple propulsion systems operating in gravitational fields of multiple celestial bodies.
U.S. Government Purpose Release

CORSAIR Three-Dimensional Unsteady Viscous Flow Analysis/WILDCAT
Two-Dimensional Unsteady Viscous Flow Analysis, Version 35.05.01.01   MFS-31622-1

CORSAIR is a three-dimensional unsteady Navier-Stokes analysis used for solving flows in rotating turbomachinery components. CORGRD is the grid generator written to accompany the CORSAIR analysis. The grid generator produces overlaid O-H grids for rotating turbomachinery components, including those with tip clearance and varying endwall radii. WILDCAT is the two-dimensional counterpart of CORSAIR.
U.S. Government Purpose Release (Project)

Data Parallel Line Relaxation Code (DPLR), Version 4 — ARC-16021-1A

The DPLR software package is a suite of CFD tools for the computation of supersonic and hypersonic flows in chemical and thermal nonequilibrium. Included in the package are 2D/axisymmetric and 3D structured grid finite volume Navier-Stokes codes, a pre-processor, and a post-processor. The code supports implicit boundary conditions, generalized multi-block topologies, grid alignment to flow features, and generalized chemical kinetics and thermodynamic property databases.

U.S. Government Purpose Release

Decelerator System Simulation (DSS) — MSC-24014-1

DSS software predicts and analyzes the dynamics of a load of cargo dropped with parachutes from an aircraft, from the first motion in the aircraft until the payload reaches the ground. The system, which comprises a Microsoft Windows version paired with Excel, is easier to use than the UNIX system-based version.

U.S. Release Only

Design Process Integration (DPI) — KSC-12294

Design Process Integration (DPI) is a systems engineering approach using an integrated database. It provides checklist-type data input forms to assure compliance with contractual requirements and also provides a common database repository for the information behind the released design drawings.

U.S. Release Only

Direct Multiple Shooting Optimization With Variable Problem Parameters Software — MSC-24795-1

Taking advantage of a novel approach to the design of the orbital transfer optimization problem, this method reduces the need for making an advanced initial guess. Complex periodic orbits can be targeted with very simple guesses, and the method can find optimal transfers in spite of bad guesses. The results with this new approach demonstrate the potential for increasing robustness in finding solutions for all types of orbit transfer problems.

U.S. Government Purpose Release

Distributed Intelligent Agents for Information Management and Sharing (DIAMS) — ARC-14654-1

DIAMS is a network of collaborative agents that facilitate information access, management, and sharing. Personal agents store collections of information relevant to a person or group. The information is organized by the user in a graph structure, and a collection browser is provided that decomposes the graph structure into a hierarchy for ease of display. Personal agents extend the user's graph structure by (a) automatically extracting keywords from the graph nodes, (b) forming a network of information that may be browsed by the user, and (c) exchanging information in this process and suggesting new information sources to the user. Finally, a matchmaker agent is provided to assist in the discovery of other personal agents.

U.S. and Foreign Release (Academic)

Disturbance-Optics-Controls-Structures (DOCS) Toolbox — GSC-15019-1

The DOCS Toolbox is a software tool for performing integrated modeling for multidisciplinary analysis and design. The tool allows the definition of subsystem/component models, including structural models, control system models, optical sensitivities, and disturbance models. The component models are automatically coupled together to create a math model of the complete coupled physical process, using techniques that maximize the numerical conditioning while maintaining modeling accuracy.

U.S. Government Purpose Release

DSMC Analysis Code (DAC) Software for Simulating Rarefied Gas Dynamic Environments   MSC-23445-1

Innovators at NASA's Johnson Space Center have developed software that is an easy-to-use implementation of the Direct Simulation Monte Carlo (DSMC) method that can be applied to a broad base of low-density flow problems. Its built-in flexibility, automation, and intuitiveness, combined with the potential of its parallel processing capabilities, provides an easy-to-use, high-performance solution for analyzing rarefied flows.
U.S. Release Only

EDLFLOW-F: A Next-Generation High-Order High-Fidelity All-Speed Time-Accurate Flow Solver for Simulating Fluid Flows   ARC-16349-1

EDLFLOW-F solves the unsteady three-dimensional equations for compressible flow using a fourth-order Runge-Kutta integration scheme and a sixth- and/or tenth-order compact differencing scheme for spatial derivatives. Deforming geometry simulations can be carried out using this solver. The technology can also be used in a low-order mode as a Reynolds-Averaged Navier-Stokes (RANS) solver. Any flow regime—from incompressible flow to hypersonic flow about arbitrary geometries—can be simulated using EDLFLOW-F.
U.S. Government Purpose Release

EO-1 Sensor Observation Service (EO-1 SOS)   GSC-16272-1

The EO-1 sensor web links together ground and space-based instruments to enable autonomous collaborative observation collections for any number of phenomena of scientific interest. The EO-1 Sensor Observation Service (SOS) provides a method to discover and retrieve EO-1 data sets based on Open GeoSpatial Consortium (OGC) Sensor Web Enablement (SWE) standards.
U.S. Government Purpose Release

EO-1 Sensor Planning Service (EO-1 SPS)   GSC-16271-1

The EO-1 sensor web links together ground and space-based instruments to enable autonomous collaborative observation collections for any number of phenomena of scientific interest. The EO-1 Sensor Planning Service (SPS) provides a method to post a task request for EO-1 and also to obtain tasking feasibilities.
U.S. Government Purpose Release

eProc Electronic Procedure System for Spacecraft Glass Cockpits (eProc System)   MSC-25186-1

Crew members have the ability to perform all display tasks manually or with electronic procedures. This electronic procedure system, referred to as eProc, is designed as a powerful alternative to reduce crew workload. eProc assists crew members by highlighting vehicle states on a display and cueing up appropriate displays, pop-ups, and commands. eProc is also linked to fault messages, so that crew members can quickly access procedures to any message that appears on the fault summary or log displays.
U.S. Release Only

Executable SysML Model Development Accelerator   MSC-25675-1

This suite of tools allows system engineers to derive the appropriate SysML models for their intended use. In addition to providing a generic library of space systems models and methods to customize these models to the specific target system, this project also provides tools that enable the automatic or semi-automatic extraction of appropriate information from different sources. Benefits realized from using a set of executable models include the increase in safety, reduction of training costs, and shortening of lifecycle through early detection and resolution of errors.
U.S. Government Purpose Release

10. Design and Integration Tools

Exploration Visualization Environment (EVE)   LAR-17782-1

The Exploration Visualization Environment (EVE) is a simulation, visualization, and analysis system designed to integrate engineering data with a virtual environment in support of the design and planning of space-based missions. Through the integration of time-dependent data with detailed graphical models within a full-scale three-dimensional solar system, the analyst can gain valuable insight into the correlation of data with simulation events. EVE provides a rich set of navigation tools (both in time and space) to enable the user to analyze the data.
U.S. Government Purpose Release

ExPRESS Logistics Carrier Suitcase Simulator Software   GSC-15813-1

The ExPRESS Logistics Carrier Suitcase Simulator Software simulates the ExPRESS Logistics Carrier Flight Software and the ExPRESS Logistics Carrier hardware interfaces for experiments. Analog and digital channels are supported by a custom SAB PCI card that allows the user to configure each of the analog and digital channels to the experiment.
U.S. Government Purpose Release

FCOD Rapid Prototyping Lab Generic Display Software (FCOD Generic Displays)   MSC-25185-1

This software permits the user to interact with and understand the user interface for a generic "glass" space-craft cockpit. Based on standards developed by NASA for the Orion spacecraft, it simulates various phases of flight and various malfunction situations to help users understand operating a spacecraft exclusively through computer screens instead of a large number of physical switches, gauges, and other controls.
U.S. Government Purpose Release

Finite-Rate Chemistry, Overset-Grid, Dual-Time Combustion-Reentry Code   ARC-15601-1

This technology modifies the OVERFLOW code for finite rate and equilibrium chemistry by substituting the perfect gas model built into the code with a model assuming a gas made up of a mixture of thermally perfect gases. Four extra field variables were added, corresponding to pressure, temperature, coefficient of thermal conductivity, and the new pressure derivative X.
U.S. Government Purpose Release

Flight Dynamics Simulation of a Generic Transport Model   LAR-17625-1

This software is a flight dynamics simulation of a transport aircraft. It implements general rigid body equations of motion for the vehicle dynamics and draws aerodynamic forces from a standard coefficient expansion implemented as table lookups. Dynamics of actuator servos and bandwidth of sensors are also included. The simulation is coded in Simulink, a model-based environment using a commercial simulation package from Mathworks, Inc. The software is not stand-alone; it must be run from inside this commercial environment, making use of numerical libraries for basic operations as well as the overall time-stepping and numerical integration routines.
U.S. Release Only

Fluid Line Heater Design Analysis Tool and Application to TG-15000 Conductivity   MSC-24983-1

This spreadsheet analyzer software program represents a simplified one-dimensional heated line with a rope heater or any heater system for which the heater input can be expressed in terms of watts per foot. The tool models a cylindrical insulated heater-wrapped line (tube) that radiates to a surrounding environment. The simplified tool can be applied to many similar applications to rapidly perform simplified insulated heated line thermal analysis to help with design problems utilizing multiple variables.
U.S. Government Purpose Release

Formation Flying Orbit Propagation   GSC-14720-1

This software provides robust methods of analysis for multiple spacecraft mission design. The technology allows the user to choose between several dynamics models, an appropriate numerical integrator, and many high-fidelity models.
U.S. Government Purpose Release

Freespace Simulation Environment   GSC-15480-1

The Freespace Simulation Environment is a collection of software applications for the design and analysis of complex system dynamics. It uses a shared memory workspace and inherent multi-processor architecture to parallelize and process data from simulations.
U.S. Government Purpose Release

Fully Implicit Ablation and Thermal Analysis Program (FIAT), Version 2.6   ARC-15779-1

FIAT is a computer program developed for simulation of one-dimensional thermal energy transport in a multilayer stack of isotropic materials and structures that can ablate from the front surface and decompose in depth. The implicit solution algorithm and general solution technique make the program very stable and robust for application to reusable launch vehicles as well as to planetary entry probes that use newly developed, lightweight ceramic ablators.
U.S. Government Purpose Release

FUN3D, Version 10.0: Mixed Elements Capability   LAR-17058-1

This technology solves for the aerodynamic flow field velocity vectors around any vehicle in three dimensions. The Version 10.0 release incorporates Mixed Elements Capability.
U.S. Release Only

functional Availability Simulation Tool Enhanced Release (fASTER)   MSC-24823-1

fASTER is a Monte Carlo simulation tool that assists the International Space Station (ISS) Program with determining logistics support resources by simulating a multitude of different operational scenarios of the ISS configuration (during and following assembly). This allows for the impacts of complex program resource restrictions and constraints (e.g., crew maintenance time, carrier upmass capability, and sparing postulate) to be assessed and reported.
U.S. Government Purpose Release

GASRAD: A Computer Program for Thermal Radiation
from Gaseous Rocket Exhaust Plumes   MFS-31685-1

GASRAD is a computer code for predicting incident thermal radiation from defined plume gas properties in either axisymmetric or cylindrical coordinate systems. It predicts plume-induced radiation using band models. Radiation is integrated over a hemisphere above the receiver.
U.S. Release Only

General Maneuver Program (GMAN), Release 2001.01   GSC-14638-1

The General Maneuver Program (GMAN) was developed to provide a digital program to compute both orbital and spin-axis re-orientation maneuver parameters for various spacecraft. Specifically, GMAN computes the detailed maneuver scenarios necessary to achieve desired orbit and attitude maneuvers.
U.S. Government Purpose Release

General Mission Analysis Tool (GMAT), Version 2011A   GSC-16228-1

GMAT is a software system for trajectory optimization, mission analysis, trajectory estimation, and prediction. Analysts use GMAT to design spacecraft trajectories, optimize maneuvers, perform orbit determination, visualize and communicate mission parameters, and understand a mission's trade space. GMAT contains models of real-world objects such as spacecraft and thrusters, as well as analysis "objects" such as plots and reports. These objects are used in the mission sequence wherein the user employs commands supported by the system to model missions and perform estimation. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/GMAT/index.php>

Open Source

Generalized Computer-Based Computation Of Venturi and Orifice Pressure Drops   SSC-00161-1

This is a set of computer program routines that calculate and determine pressure drops and recoveries through standard venturis, nozzle-venturis, and orifices, for cavitating, choked, non-cavitiating, and unchoked flow conditions for liquids, gases, and superciritical fluids. It can determine which of these flow conditions will occur.

General Public Release

Generalized Fluid System Simulation Program (GFSSP), Version 5.0 (Educational Version)   MFS-32929-1

The Generalized Fluid System Simulation Program (GFSSP) is a general software tool that can perform complex fluid flow analysis in a wide variety of applications, including those related to chemical processing, gas processing, power plants, hydraulic control circuits, and various kinds of fluid distribution systems. Example problems can be used effectively as a teaching aid to students as part of their senior undergraduate or graduate coursework.

U.S. Release Only

Generalized Fluid System Simulation Program (GFSSP), Version 6.0   MFS-33019-1

The Generalized Fluid System Simulation Program (GFSSP) is a general software tool that can perform complex fluid flow analysis in a wide variety of applications, including those related to chemical processing, gas processing, power plants, hydraulic control circuits, and various kinds of fluid distribution systems. The tool models liquid fuel phase changes that include compressibility and mixture thermodynamics and allows the user to apply and vary "what-if" effects of external influences.

U.S. Government Purpose Release

General-Use Nodal Network Solver (GUNNS)   MSC-25468-1

GUNNS is a flow system modeling software package that combines nodal analysis and the hydraulic-electric analogy to simulate fluid, electrical, and thermal systems. It has a reusable component and system design that allow integration with a graphical user interface (GUI), and provide the capability for rapid GUI-based simulator development, ease of maintenance, and associated cost savings.

U.S. Government Purpose Release

Generic Reusable Aerospace Software Platform (GRASP)   GSC-15695-1

The purpose of GRASP is to provide a generic operating-system-independent framework for creating multi-process real-time applications. In the modular GRASP architecture, all operating system and hardware interfaces are isolated within GRASP libraries. The application developer uses GRASP interface libraries and device drivers to interact with external hardware. Should a new hardware item require a driver, that development would be part of GRASP and would be added to the GRASP interface libraries and become available for future projects. GRASP application software is developed by using the GRASP template, which offers access to the services GRASP provides. The templated generic code handles process initialization, thread creation, inter-process messaging, process health monitoring, data logging, data distribution, etc., with hooks that provide for subsystem tailoring. Using GRASP allows application developers to concentrate on mission specifics, reducing development time, cost, and risk.

U.S. Government Purpose Release

Global Modeling Initiative (GMI) Software
GSC-15363-1

The Global Modeling Initiative (GMI) is a state-of-the-art, modular 3D chemistry and transport model (CTM) that can be used for assessment of the impact of various natural and anthropogenic perturbations on atmospheric composition and chemistry, including, but not exclusively, the effect of aircraft.
U.S. Government Purpose Release

Goddard Dynamic Simulator (GDS)
GSC-15340-1

The Goddard Dynamic Simulator (GDS) is used to test both software and hardware flight systems. GDS software integrates the dynamics equations of motion for a spacecraft, models environmental forces acting on the spacecraft, models spacecraft components such as reaction wheels, thrusters, star trackers, other actuators and sensors, and instruments.
U.S. Government Purpose Release

Goddard Mission Services Evolution Center Architecture Application Programming Interface (GMSEC API)
GSC-15143-1

The GMSEC Application Programming Interface (API) supports and enhances GMSEC architecture concepts. It is an isolation layer that allows GMSEC architecture users to change out commercial off-the-shelf and government off-the-shelf information or message buses without any software changes to the GMSEC components. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/GMSEC_API_30/index.php>
Open Source

Goddard Mission Services Evolution Center Architecture Application Programming Interface (GMSEC API), Version 3.0
GSC-15900-1

The GMSEC Architecture API isolates the middleware from the components and normalizes middleware behavior. Using the standard messages along with the GMSEC API allows a component to be GMSEC compliant.
U.S. Government Purpose Release

Goddard Satellite Data Simulation Unit
GSC-15874-1

The Goddard Satellite Data Simulation Unit (SDSU) is a comprehensive unified system of multi-sensor satellite instrumental simulators. Skill of weather forecasting models can be evaluated in terms of satellite-observed multi-sensor radiance levels. Alternatively, the remote sensing community can more readily utilize atmospheric model simulations to develop and test their retrieval algorithms for application of Earth science.
U.S. Government Purpose Release

Goddard Trajectory Determination System (GTDS), Release 2001.01
GSC-14639-1

The Goddard Trajectory Determination System (GTDS) is a collection of related computer programs that provide operational support for Earth, lunar, and interplanetary missions and serve as a research and development tool.
U.S. Government Purpose Release

Grid Sequencing Software for Structured Computational Fluid Dynamics (CFD) Grids, Version 1.0
SSC-00167-1

This software enables a user with a structured grid to generate any number of refined and/or coarsened grids. Any grid refinement/coarsening ratio can be used (not just integer ratios), and the user is allowed to specify the grid ratio to use. The software can also generate restart files on any of the original, coarsened, or refined grids from any existing restart file/grid file pair. A graphical user interface is included.
U.S. Government Purpose Release

GTM_Polysim—Nonlinear GTM Aircraft Polynomial Simulation in MATLAB, Version 2.0 — LAR-17595-1

The GTM_POLYSIM is a nonlinear simulation of the Generic Transport Model (GTM) aircraft at a 5.5-percent scale. The simulation software is a collection of scripts and programs written and executed in the MATLAB computing environment.

U.S. Release Only

Implicit Finite-Difference Code for a Two-Equation Turbulence Model for Three-Dimensional Flows (KEM) — ARC-16271-1

This semi-implicit finite-difference code solves the transport equations for the turbulence kinetic energy and its dissipation rate in generalized curvilinear coordinates in three dimensions. The finite difference equations are solved using the Beam-Warming approximate factorization algorithm.

U.S. Government Purpose Release

Integrated Lunar Information Architecture for Decision Support (ILIADS) — GSC-15339-1

ILIADS is a lunar data system providing support related to NASA's Exploration Initiative. ILIADS includes three primary components: (1) The ILIADS Spatial Database houses a mosaiced subset of lunar data for rapid access and a spatial reference to primary lunar archives. (2) The ILIADS Lunar Exploration and Analysis Portal (LEAP) is a Web portal to facilitate collaboration between scientists and engineers regarding lunar exploration. Finally, (3) the ILIADS XGIS (or eXploration Geographical Information System) provides lunar data visualization and analytical tools and models.

U.S. Government Purpose Release

Integrated Lunar Information Architecture for Decision Support (ILIADS), Version 3.0 — GSC-16210-1

ILIADS 3.0 provides the data management capabilities to access CxP-vetted lunar data sets from the LMMP-provided Data Portal and the LMMP-provided OnMoon lunar data product server. (LMMP stands for Lunar Mapping and Modeling Project.) It also provides specific quantitative analysis functions to meet the stated LMMP Level 3 functional and performance requirements specifications that were approved by the CxP.

U.S. Government Purpose Release

Integrated Modeling Environment — GSC-14827-1

The Integrated Modeling Environment is a tool to integrate people, processes, and data. The technology incorporates life cycle management, configuration management, visualization tools, and collaboration tools. Key functionality includes creating, managing, and developing modeling analyses over their entire life cycles; publishing model and analysis information for availability and reuse throughout the user community; and managing legacy information without regard to original formats, database organizations, or computing platforms.

U.S. Government Purpose Release

INTegrated ROcket Sizing Model (INTROS) Analytical Tool for Design and Sizing of Launch Vehicles, Version 3.0 — MFS-32199-1

The INTegrated ROcket Sizing Model (INTROS) is used to perform conceptual and preliminary design sizing and trade and sensitivity studies for launch vehicles. Sizing is done in terms of establishing architectural breakdown structures and related geometry and mass properties.

U.S. Government Purpose Release (Project)

International Space Station (ISS) Onboard Emergency Simulator Software — MSC-25520-1

This technology enables onboard crewmembers to receive more effective training during regularly scheduled emergency drills onboard the ISS.

U.S. Government Purpose Release

10. Design and Integration Tools

James Webb Space Telescope Independent Verification and Validation Simulation and Test (JIST) Core   GSC-16739-1

JIST executes James Webb Space Telescope (JWST) test procedures, exercises the flight software subsystems, injects hardware and software faults, and integrates additional tools to support test objectives. The components, models, and interfaces can be reused on other missions that utilize similar interfaces and components.
U.S. Government Purpose Release

James Webb Space Telescope Independent Verification and Validation Simulation and Test (JIST) RT Logic T501 Emulator   GSC-16740-1

The T501 emulator, developed in support of the JIST environment, receives software commands via TCP/IP packets and converts them for the James Webb Space Telescope (JWST) test bed's hardware.
U.S. Government Purpose Release

JavaGenes Genetic Graphs   ARC-14293-1

JavaGenes is a genetic algorithm code written in Java. It evolves graphs using genetic software techniques and has applications in designing drugs, circuits, or any other system that is easily represented by graphs. JavaGenes can be downloaded at: <http://ti.arc.nasa.gov/opensource/projects/javagenes/>
Open Source

JavaGenes-Scheduler: Evolutionary Software for Earth Observing Satellite Scheduling   ARC-15103-1

JavaGenes-Scheduler is a general purpose evolutionary system designed to compare techniques for scheduling observations. It was originally developed for scheduling observations made by Earth-observing satellites. JavaGenes-Scheduler uses a simple, earliest-first scheduler to insert observations into the timeline in permutation order. JavaGenes-Scheduler can be downloaded at: <http://alglobus.net/NASAwork/JavaGenes>
Open Source

Johnson Space Center Engineering Orbital Dynamics (JEOD), Version 1.4   MSC-24532-1

JEOD is a collection of mathematical models, represented as differential equations, used to generate vehicle trajectories. The mathematical model set includes seven categories of functional capabilities, with each capability implemented in a collection of software modules written in the ANSI C programming language. While the modules are designed to work with NASA's Trick Simulation Development Environment, they also can be used in virtually any time-stepped integrated simulation software package.
U.S. Government Purpose Release

Johnson Space Center Engineering Orbital Dynamics (JEOD), Version 2.0   MSC-24556-1

Version 2.0 of JEOD extends the capabilities of Version 1.4, allowing users to model scenarios anywhere in outer space. Version 2.0 has a more flexible coordinate system framework and management scheme as well as a new time-scale model.
U.S. Government Purpose Release

Johnson Space Center Engineering Orbital Dynamics (JEOD), Version 3.0   MSC-25730-1

The JEOD software package is a collection of computational mathematical models used to accurately represent the dynamic state of a spacecraft in a planetary environment. Version 3.0 contains innovations in a number of technical areas.
U.S. Government Purpose Release

Knife, Version 1.0   LAR-17481-1

The Knife library calculates the boolean subtraction of arbitrary watertight triangular polyhedral in order to make near-field sonic boom predictions.
U.S. Release Only

Langley Stability and Transition Analysis Code (LASTRAC)   LAR-16260-1

LASTRAC is a C++ code that analyzes compressible boundary-layer stability and performs transition prediction using the state-of-the-art Linear Stability Theory (LST) or Parabolized Stability Equations (PSE) methods.
U.S. Release Only

Launch Vehicle Analysis (LVA) Tool   MFS-31694-1

The Launch Vehicle Analysis (LVA) Tool is a software program that integrates ground and flightload analysis with direct-solution structural and thermal analysis. A typical solution can be obtained, starting from scratch, in thirty to sixty minutes, and subsequent runs can be done in less than two minutes.
U.S. Government Purpose Release (Project)

Launch Vehicle Loads Analysis for Preliminary Design (VLOADS)   MFS-27332

The VLOADS program calculates launch vehicles' in-flight structural loads for preliminary design. The program may also be used to calculate structural loads for upper stages and planetary transfer vehicles. Launch vehicle information and input data are compiled and analyzed by VLOADS to produce distributed shear loads, bending moments, axial forces, and vehicle line loads as a function of X-station along the vehicle's length.
U.S. Release Only

LAURA.5   LAR-17673-1

LAURA.5 is a structured, multi-block, computational aerothermodynamic simulation code. It provides a major refactoring of the original LAURA code in a modular structure utilizing Fortran 95. The technology shares gas physics modules, MPI modules, and some fundamental data set modules with the unstructured-grid code FUN3D.
U.S. Release Only

Low-Order Potential Flow Panel Code (PMARC), Version 14   ARC-14407-1

PMARC is a potential flow panel code to numerically predict flow fields around complex three-dimensional geometries. PMARC contains several features that allow the study of both steady and unsteady motions, including problems involving relative motion.
U.S. Government Purpose Release

Mac/Linux TetrUSS Computational Fluid Dynamics (CFD) Software   LAR-16882-1

The most awarded software in the history of NASA, TetrUSS is a suite of computer programs used for fluid dynamics and aerodynamics analysis and design. The software is widely used in other government organizations, the aerospace industry, academia, and non-aerospace industries such as automotive, bio-medical, and civil engineering.
U.S. Release Only

Managed Automation Environment for Simulation, Test, and Real-time Operations (MAESTRO) Software Pre-release   MFS-32601-1

MAESTRO is a suite of tools that assist in the setup, configuration control, and operation of a simulation/test laboratory. The software was designed to fit into the NASA Constellation design philosophy by being command, control, communication, and information (C31) compliant.
U.S. Government Purpose Release (NASA)

Marshall Aerospace Vehicle Representation in C (MAVERIC-II)   MFS-31989-1

Marshall Aerospace Vehicle Representation in C (MAVERIC-II) is a generic low-to-high-fidelity six-degree-of-freedom vehicle flight simulation program.
U.S. Government Purpose Release (NASA)

Marshall Aerospace Vehicle Representation in C (MAVERIC-X)   MFS-31673-1

Marshall Aerospace Vehicle Representation in C (MAVERIC-X) is a generic low-to-high-fidelity six-degree-of-freedom vehicle flight simulation program that facilitates the rapid development of flight simulations for launch vehicles and spacecraft. It was designed to accommodate multi-staged vehicles, powered serially or in parallel, with multiple engines, tanks, and cargo elements.
U.S. Release Only

MBJEOD: An Integrated Multibody and Orbital Dynamics Simulation Module   MSC-25732-1

MBJEOD combines the power of MBDyn (multibody dynamics software) and JEOD (orbital dynamics software) to form an integrated multibody orbital dynamics simulation capability.
U.S. Government Purpose Release

Method and System for Procedure Development and Verification by Formal Specifications Derived Mechanically from Informal Procedure Descriptions   GSC-15043-1

Based on a unique method for generating a formal model from the informally expressed requirements of a computer-based system and subsequently automatically generating code that implements those requirements in a way that is guaranteed to be correct, this technique allows for the analysis, validation, and verification of complex procedures and scripts.
U.S. Government Purpose Release

Method for Quickly Approximating Center of Pressure and Projected Area from Computer Models of Structures (CPCalc)   GSC-14690-1

CPCalc simplifies the approximation of the center of pressure (CP) and projected area of a spacecraft using images of the computer-aided design (CAD) models that can be generated using numerous CAD tools. The technology requires little input and is flexible enough to be useful for many applications that require quick approximations of projected area and centroid for complex shapes.
U.S. Government Purpose Release

Micrometeoroid and Orbital Debris (MMOD) Shield Ballistic Limit Analysis Program   MSC-24582-1

This technology evaluates proposed shield configurations for probability and depth of penetration if hit by orbital debris. The software enables a user to calculate preliminary dimensions of a shield configuration (thickness, density, and spacing) and then analyze the performance of the user-defined shield configuration over a range of relevant in-orbit impact conditions.
U.S. Release Only

Mission Control Technologies (MCT)   ARC-15256-1A

MCT builds software from small pieces that can be assembled by end users to create integrated functionality. Applications are eliminated in favor of compositions of "live objects" that can be combined in different ways for different users and missions as required, in contrast to the more traditional software development method of pre-determining functionality and building a monolithic application. MCT can be downloaded at: <https://github.com/nasa/mct>
Open Source

Modal Identification of Dynamic Operational Systems (MIDOS), Version 1   MSC-25707-1

MIDOS is a software toolkit consisting of a user interface, data interfaces, signal processing, data analysis, parameter identification, and reporting modules to allow the structural dynamics analysis of systems that are not specifically configured for relevant laboratory testing.
U.S. Government Purpose Release

Model Development for Exhaust Plume Impingement Effects on Launch Stand Design (PLIMP/LSD)   MFS-26283-1

A two-phase Navier Stokes code has been developed to improve plume and plume impingement methodology. An easy-to-use thermal response model enables designers to evaluate the plume impingement load on a structure more rapidly and to evaluate the necessary modifications more rapidly.

U.S. and Foreign Release

Monocoque Tank Analysis Spreadsheet System (MonTASS), Version 2.0   MFS-31223-1

The Monocoque Tank Analysis Spreadsheet System (MonTASS) computer program enables rapid analysis and preliminary design of structural domes and truncated sections of cones. MonTASS performs both design and analysis functions and can be used to analyze nonpressurized conical structures.

U.S. Release Only

Monte Carlo Simulation Tool for Determining Logistical Support Resources Scenarios   MSC-24823-1

This Monte Carlo simulation tool uses a random number generator process to help simulate failures over the life of the International Space Station for the purposes of training. It uses an intuitive user interface that facilitates fast setup of each model simulation.

U.S. Government Purpose Release

Multicomponent Ablation Thermochemistry (MAT) Program   ARC-15308-1

MAT implements a general theory for ablation thermochemistry of thermal protection materials with multiple surface species. The theory includes the capability for simultaneous ablation, pyrolysis, surface-element constraints, nonequilibrium surface reactions, and material failure.

U.S. Government Purpose Release

Multidimensional, Multiphysics Computational Heat Transfer Analysis Software (UNIC)   MFS-32554-1

The Multidemensional, Multiphysics Computational Heat Transfer Analysis Software (UNIC) solves transient, coupled, and simultaneous conjugate heat transfer solutions commonly encountered in rocket engine and launch vehicle component design and analysis.

U.S. Release Only

NASA Design and Analysis of Rotorcraft (NDARC)   ARC-16265-1

NDARC software is an aircraft system analysis tool that supports both conceptual design efforts and technology impact assessments of rotorcraft that meet specified requirements. The architecture of the NDARC code accommodates configuration flexibility, a hierarchy of models, and ultimately multidisciplinary design, analysis, and optimization.

U.S. and Foreign Release (Academic)

NASA.rb (formerly fUnit)   GSC-15137-1

NASA.rb (formerly fUnit) is a collection of Fortran modules that provide a framework for automating the construction, execution, and reporting of unit tests for Fortran software applications. Support is provided for several aspects of unit testing that are peculiar to scientific technical computing including distributing jparallel applications and parameterized behavior.

Open Source

NASA STRuctrual ANalysis (NASTRAN)   LAR-16804-GS

NASTRAN is a finite element analysis program that was originally developed for NASA in the late 1960s under U.S. government funding for the aerospace industry. The software suite provides engineers a comprehensive simulation solution for insight into structural behavior. NASTRAN source code is integrated in a number of different software packages, which are distributed by a range of companies.

U.S. Release Only

NEQAIR—Nonequilibrium Radiative Transport and Spectra Program   ARC-15262-1A

NEQAIR is a complex, first principles computer code created by combining and extending three separate computer codes: (1) NEQAIR, a high-temperature nonequilibrium and equilibrium code that calculates the populations of excited energy levels and the associated radiative emission and transport, (2) Rotational Line Intensity Factors code for calculating accurate spectra for diatomic molecules, and (3) Equilibrium Chemistry code for calculating specie concentrations.
U.S. Government Purpose Release

NetworKing: Space Communications and Navigation (SCaN) App   ARC-16778-1

The NetworKing Game is an educational, interactive 3D game in which the player develops a space communication network. As he builds his network infrastructure, client spacecraft are attracted to the network, generating income and allowing the player to build further. As the player expands his robust communication network, fortunate and unfortunate events occur. The game can be downloaded at: <http://www.nasa.gov/multimedia/3d_resources/scan.html>
General Public

Nozzle Aero Thermochemistry (NAT) Computer Code   MFS-31961-1

The Nozzle Aero Thermochemistry (NAT) code was developed as a part of the Nozzles Work Package of the Solid Propulsion Integrity Program (SPIP). NAT gave solid rocket motor (SRM) analysts the capability to accurately determine heating conditions throughout SRM muzzles and supplied nozzle designers the ability to design nozzle liner components with greater confidence.
U.S. Government Purpose Release

Numerical Integrator Library   GSC-14735-1

This software provides robust methods of analysis for distributed groups of spacecraft that are acting collectively to achieve a common goal. The design allows the user to choose between several dynamics models, an appropriate numerical integrator, and many high fidelity environment models.
U.S. Release Only

Open Geospatial Consoritum (OGC) Compatible Publish/Subscribe Service—Basic (OPSB)   GSC-16270-1

The OPSB provides a method for users to define subscriptions and receive notifications when data products are ready. The technology is based on OGC standards and is a type of Web Notifcation Service (WNS).
U.S. Government Purpose Release

OVERFLOW 2: Overset Grid Computaitonal Fluid Dynamics (CFD) Flow Solver with Moving Body Capability   LAR-17079-1

OVERFLOW 2 is a computer code for simulating viscous, compressible fluid flow about complex aerodynamic configurations. The technology solves the Reynolds-averaged Navier-Stokes equations using structured, overset computational grids. It includes the capability for simulating multiple moving bodies acting under prescribed or aerodynamically forced motion. OVERFLOW 2 is a merge of the previously developed OVERFLOW 1.8 and OVERFLOW-D codes.
U.S. Release Only

Parallel Adaptive Mesh Refinement Library (PARAMESH)   GSC-14626-1

PARAMESH offers parallel support with adaptive mesh capability for a large class of models on distributed memory machines. This package of Fortran 90 subroutines provides an application developer with an easy route to extend an existing serial code using a logically Cartesian structured mesh into a parallel code with adaptive mesh refinement.
U.S. Release Only

PHANTOM: A Unified Flow Analysis for Turbomachinery Flows — MFS-32321-1

PHANTOM is a unified, three-dimensional, unsteady Navier-Stokes analysis used for solving flows in rotating turbomachinery components operating in liquids or gases. Working fluids could be air, liquid or gaseous hydrogen, liquid or gaseous oxygen, kerosene, or others. The flow may be incompressible (e.g., a fuel pump in a liquid-fueled rocket engine) or compressible (e.g., the turbine that drives that fuel pump).

U.S. Release Only

Plasma Modeling Software — ARC-15444-1

A self-consistent continuum fluid model has been developed for the analysis of plasma reactors. The model couples gas flow, heat transfer, and electromagnetics to plasma transport and generation. The software allows investigation of neutral and charged species densities, species momentum, along with gas, ion, and electron temperatures and can be used for a wide variety of reactor configurations. Its modular design allows for easy extension to other applications or alteration of the numerical integration and discretization techniques. With the software, the effect of process or equipment design changes can be readily seen, providing a cost-effective alternative to trial-and-error design. The software can also be easily used in emerging technology fields such as nanotechnology to help understand basic underlying physical phenomena and bring these technologies to maturation.

U.S. and Foreign Release

Plume Impingement Effect (PLIMP) — MFS-26292-1

Plume Impingement Effect (PLIMP) can be used to simulate the impingement of rocket engine exhaust on nearby spacecraft surfaces.

General Public

Polynomial-Based Nonlinear Simulation of a Generic Transport Model (GTM) Aircraft — LAR-17462-1

A nonlinear six-degree-of-freedom simulation for a generic transport model aircraft was created using MATLAB. The simulation and 3D displays run in real time in response to pilot inputs using contemporary desktop personal computer hardware; the simulation can also be run in batch mode. The technology includes the full nonlinear dynamics of the bare airframe with a scaled direct connection from pilot inputs to control surface deflections.

U.S. Release Only

Porous Material Analysis Toolbox (PATO) Based on OpenFoam — ARC-16680-1

PATO is a modular analysis platform specifically implemented to test physics-based models for porous materials submitted to high-temperature environments or other unusual conditions. PATO is a C++ library implemented in the OpenFOAM framework. The governing equations implemented in the different modules are volume-averaged forms of the mass-, momentum-, and energy-conservation equations for porous media.

U.S. and Foreign Release (Academic)

Prediction of Launch Vehicle Ignition Overpressure and Liftoff Acoustic Environments (LAIOP) — MFS-32579-1

LAIOP predicts both ignition overpressure and launch acoustics. The code uses a graphical user interface to communicate with the user and display results. Tabular or graphical outputs can be reviewed by the user, and on-line help is available. The software is configured to allow for new options and further expansion.

U.S. Government Purpose Release

Program to Optimize Simulated Trajectories II (POST II) LAR-16533-1

POST II is a multibody, 3D to 6D simulation that calculates trajectories for all aeronautical and space flight vehicles. Its outputs are used to optimize control settings for flight. The technology has been used on the Mars Exploration Rover, Genesis, HyperX , and other programs. POST II can support multiple vehicles in a single simulation, each with independently defined environment, vehicle, and attracting body characteristics.
U.S. Government Purpose Release

Propulsion System Controller Checkout (PCOC) Software MFS-32259-1

The Propulsion System Controller Checkout (PCOC) Computer served as the electrical ground support equipment for FASTRAC engine avionics. The PCOC software that executed on the computer provided a window into engine operation, as well as main propulsion system operation and thrust vector control system operation. The software displayed a graphical representation of the FASTRAC engine and associated MPS, offering visual indications of tank levels, valve positions, propellant locations, and engine ignition.
U.S. Government Purpose (Interagency) Release

Reactive and Multi-Phase (RAMP2) Computer Program MFS-31602-1

The RAMP2 computer program predicts nozzle flowfields of supersonic and rocket nozzle performance. The tool is capable of multi-phase flowfield analysis including high-altitude plumes. Code enhancements account more accurately for variable oxidizer/fuel ratios.
U.S. Release Only

Realtime Evaluation and Analysis of Consolidated Health (REACH) GSC-14492-1

The REACH tool provides concise, intuitive visualizations of health models for multiple spacecraft. It helps mission operations staff quickly identify and diagnose risks to the health and safety of multi-platform and satellite constellation missions. Client-side visualizations make anomalies in the model stand out, drawing the operator's attention to the most serious problems.
U.S. Government Purpose Release

Refine LAR-16881-1

Refine is a 3D tetrahedral grid adaptation framework that is implemented with an object-oriented flavor in the C language. Most functionality is wrapped into Ruby scripting language extensions for use in test-first programing and unit testing. The technology has application to aerodynamic simulations of aircraft.
U.S. Release Only

Reusable Object-Oriented Software Package That Implements Instrument Command Building and Argument Validation GSC-15166-1

This object-oriented software package provides a collaboration of classes that together may be used to implement a robust instrument commanding scheme for use in instrument test equipment. The classes have built-in argument validation and a robust exception handling mechanism.
U.S. Government Purpose Release

RMC Code MFS-32290-1

The RMC code computes radiation from solid rocket motor flow fields. Each receiver specified in the surface input is selected in sequence. Radiation is computed for each spectral interval requested, and radiation results are summed for output. The computation for each spectral band begins with conversion of plume properties to optical properties for that band; rays from the receiver surface are generated in random directions to intersect the plume.
U.S. Government Purpose Release

ROCet Engine Transient Simulation Software (ROCETS)   MFS-31858-1

The Rocket Engine Transient Simulation (ROCETS) software consists of a library of rocket engine component software modules for combustion chambers, nozzles, turbines, pumps, valves, lines, etc. The tool can be used to analyze both steady-state and transient performance under various operating conditions in a variety of environments.

U.S. Release Only

Savors: A Scalable Aural-Visual Environment for Security Event Monitoring, Analysis, And Response   ARC-16186-1

Savors is a tool for security event monitoring, analysis, and response. The technology scales to real-world environments and uses high-end computing resources on-demand to compile behavior profiles that point to anomalous behavior. Auralization allows both monitoring and analysis to be performed in parallel and draws attention to critical events in one tool when utilizing another. Remote data access and response capabilities across distributed resources are enabled using grid computing that provides a secure, single sign-on environment. Download the program at: <http://people.nas.nasa.gov/~kolano/projects/savors.html>

Open Source

SHABERTH Preprocessor, Version 1.2   MFS-28818-1

The SHABERTH computer program was developed to predict the operating characteristics of bearings in a multi-bearing load support system. Models in SHABERTH allow for the complete mathematical simulation of real physical systems. Systems are limited to a maximum of five bearings supporting the shaft, a maximum of thirty rolling elements per bearing, and a maximum of one hundred temperature nodes. The SHABERTH program structure is modular and has been designed to permit the refinement and replacement of various component models as needs develop.

U.S. Release Only

Software Developer's Assistant (SDA)   MSC-24424-1

SDA is a process-driven platform that guides software teams through project-specific standards, processes, and procedures. The tool first breaks down software projects into required process tasks, then assigns each task to the appropriate project personnel. SDA orchestrates the performance of work required to complete all tasks in the correct sequences and then notifies team members when they may begin work on their assigned tasks.

U.S. Government Purpose Release

Software Developer's Assistant (SDA), Updated   MSC-24456

This software tool helps teams more efficiently and accurately accomplish processes associated with developing mission-critical software applications. The Software Developer's Assistant (SDA) is a process-driven platform that guides software teams through project-specific standards, processes, and procedures. The tool first breaks down software projects into required process tasks, then assigns each task to the appropriate project personnel. SDA orchestrates the performance of work required to complete all tasks in the correct sequences and then notifies team members when they may begin work on their assigned tasks.

U.S. Government Purpose Release

Software for Hybrid Airship Steady Flight Analysis and Preliminary Design   ARC-16503-1

This software helps designers of hybrid airships to understand the effects of aerodynamic and thruster performance on steady-state flight mechanics. The software is capable of producing a large number of useful plots and requires only basic geometric, mass, and aerodynamic data to describe the vehicle. The resultant plots and plotting script are compatible with a widely used and freely available plotting package.

U.S. Government Purpose Release

Solenoid Inductance Calculator   KSC-12253

The Solenoid Inductance Calculator can be used to compute the inductance approximation of a cylindrical solenoid of arbitrary dimensions. The technology's calculation method (1) uses magnetic vector potential to provide a more precise estimate of inductance and (2) is not limited to a specific range of coil geometry values.
U.S. Release Only

Space Shuttle Ascent/Entry Trainer (AET), Version 5   MSC-25252-1

Version 5 of the Space Shuttle Ascent/Entry Trainer (AET) is a simulation software package that models NASA's Space Shuttle in both ascent and entry scenarios in order to train astronauts. Functionally, the AET handles operator inputs to the hand controllers and to virtual switches on the computer monitor, and it provides feedback to the operator via the computer monitor in the form of simulated out-the-window graphics and emulated display and control panels.
U.S. Government Purpose Release

Space Station Multi-Rigid Body Simulation (SSMRBS)   MSC-25738-1

The SSMRBS innovation uses a commercial off-the-shelf software package to generate the equations of motion (EOM) used in a simulation. The EOM generated and solved in the simulation is based on an Order-N algorithm.
U.S. Government Purpose Release

Spacecraft Trajectory Analysis and Mission Planning
Simulation (STAMPS) Software   MSC-24958-1

STAMPS simulates either three- or six-degrees-of-freedom cases for all shuttle flight phases using translated HAL flight software or generic GN&C models. Single or multiple trajectories can be simulated for use in optimization and dispersion analysis. The technology includes math models for the vehicle and environment and a C version of shuttle onboard flight software.
U.S. Government Purpose Release

Station Spacewalk Game App   ARC-16779-1

This video game features simulations of Extravehicular Activities (EVAs) conducted by NASA astronauts on missions to the International Space Station. The game can be downloaded at: <http://www.nasa.gov/multimedia/3d_resources/station_spacewalk_game.html>
General Public

Station/Orbiter Multibody Berthing/Docking Analysis Tool (SOMBAT)   MSC-25528-1

SOMBAT is a multibody dynamics and control system simulation tool. It provides an integrated software environment to perform kinematic and dynamics analysis of space structures and robotic manipulators, including their control elements. The multibody system can consist of an arbitrary number of rigid and flexible bodies in an open-loop topology. The dynamics equations of a given system are generated in a computationally efficient and optimized form in SOMBAT using a symbolic code generator.
U.S. Government Purpose Release

Stochastic Electromagnetic Design and Optimization Method (ADSS)   ARC-15568-1

ADSS implements a stochastic design method with a novel representation and performance evaluation measure to automatically generate antenna designs.
U.S. Government Purpose Release

10. Design and Integration Tools

System/Observer/Controller Identification Toolbox (SOCIT), Macintosh Version   LAR-15241

SCOIT is a collection of functions, written in MATLAB language and expressed in M-files, that implements a variety of modern system identification techniques. For an open-loop system, it features functions for identification of a system model and corresponding forward and backward observers directly from input and output data. For a closed-loop system, SOCIT identifies an open-loop model, an observer, and corresponding controller gain directly from input and output data.

U.S. Release Only

Thermal Insulation System Analysis Tool (TISTool)   KSC-13561

The Thermal Insulation System Analysis Tool has been updated with more test data from the Cryogenics Test Laboratory and has been converted to Fortran 95 to allow for easier distribution.

U.S. Release Only

Total Verification System and C++ Based Verification Test Bench   GSC-16013-1

This technology verifies complex space flight digital designs in a more thorough manner than was previously possible while offering cost savings and reduced schedule time. The software combines a custom-designed GSE unit, the Total Verification System, along with a powerful test bench environment that uses C++. Together, these elements allow a high level of code reuse between all the phases of the design and test cycle.

U.S. Government Purpose Release

Transport Class Model (TCM) Aircraft Simulation Software   LAR-18322-1

This six-degree-of-freedom, flat-earth dynamics, non-linear, and non-proprietary aircraft simulation is a representation of a generic mid-sized twin-jet transport aircraft.

General Public Release

Trick 10 Simulation Environment   MSC-25630-1

The Trick Simulation Environment is a generic simulation toolkit used for constructing and running simulations. Core Trick 10 components have been rewritten in C++ and redesigned to be object oriented.

U.S. Government Purpose Release

Trick Simulation Environment   MSC-24492-1

This technology upgrades a generic simulation toolkit for constructing and running simulations, providing richer features and making the software more user-friendly. The Trick Simulation Environment is a set of software utilities that allows users to rapidly develop, integrate, and operate simulations based on the specific requirements of their application problem domains. Simulation applications range from personal computer desktop trainers to full-scale robotics hardware-in-the-loop facilities and virtual reality systems.

U.S. Release Only

Trick High-Level Architecture (HLA) Framework for Facilitating IEEE 1516 Simulation Integration   MSC-24544-1

This framework removes the complexity of adhering to the Institute of Electrical and Electronics Engineers (IEEE) 1516-2000 High-Level Architecture (HLA) standards for simulation interoperability. The framework is data driven and includes a simple application programming interface (API), making it relatively easy to enhance an existing Trick simulation into a distributed simulation.

U.S. Government Purpose Release

Uncertainty Quantification Toolbox (UQTools)   LAR-17855-1

UQTools is a MATLAB-based software package designed to efficiently analyze dynamic systems subject to parametric uncertainty. UQTools accepts uncertainty models based upon both probabilistic and non-probabilistic definitions, and it realizes several complementary methods for performing a variety of uncertainty quantification tasks.

U.S. Release Only

Unsteady Flow Analysis Toolkit (UFAT)   ARC-14800-1

UFAT is a software program for analyzing time-dependent flow fields. The technology automatically processes large-scale computer simulations to reveal salient flow features (e.g., vortices and shock waves) with little or no human interventions. UFAT effectively reduces the analysis time of multi-gigabyte datasets from weeks to hours using state-of-the-art particle tracking and feature detection algorithms.
U.S. Release Only

Upwind Parabolized Navier-Stokes Solver (UPS) for Supersonic and Hypersonic Flow Simulation, Version 6.1   ARC-15250-1

This software provides a means for simulating supersonic and hypersonic flows efficiently and accurately (under certain restrictions). The parabolized Navier-Stokes (PNS) equations are solved using an upwind finite-volume algorithm that is implicit in the marching direction. The solver includes models for turbulent flow and equilibrium- and finite-rate air chemistry.
U.S. Government Purpose Release

USM3D   LAR-16670-GS

USM3D is a tetrahedral unstructured flow solver that has become widely used in industry, government, and academia for solving aerodynamic problems. Since its first introduction in 1989, USM3D has steadily evolved from an inviscid Euler solver into a full viscous Navier-Stokes code. The technology has been a part of the NASA TetrUSS system.
U.S. Release Only

Variable O/F Ratio Method of Characteristics Program for Nozzle and Plume Analysis (MOC Program)   MFS-31901-1

This software was developed for solving 2D and asymmetric inviscid supersonic flow fields. The newer modifications provide better runtime error handling, enhanced mesh control accuracy near the nozzle exit plane, and offer additional start line control options.
U.S. Release Only

Vehicle Sketch Pad (VSP)   LAR-17491-1

The Vehicle Sketch Pad (VSP) is an aircraft geometry tool for rapid evaluation of advanced design concepts. Fast and accurate geometry modeling allows the designer to use more complex analysis methods earlier in the design process and reduces reliance on empiricism in conceptual design. VSP includes tools to model and export the internal structural layout.
Open Source

Virtual Satellite Platform (VirtualSat Pro)   GSC-14824-1

The Hammers Company has developed a virtual satellite (VirtualSat) platform environment. In this environment, enhanced functionality and autonomy of navigation, guidance, and control systems are provided by a virtual satellite simulating its dynamic behavior.
U.S. Government Purpose Release

Web Coverage Processing Service (WCPS)   GSC-16273-1

The Web Coverage Processing Service (WCPS) is an instantiation of an Open Geospatial Consortium (OGC) standard Web service that provides the user the ability to define an algorithm that will be applied to data from a sensor. This can occur in any environment in which a WCPS service can exist. Capabilities include (1) an algorithm generation service, which allows the user to create the algorithm in a generic language, test it against simulated data, and then upload it to the target environment, and (2) a runtime component that enables the user to run the algorithm against the live sensor data to create customized data products.
U.S. Government Purpose Release

Weka-to-Web Coverage Processing Service (WCPS) Translator GSC-16274-1

This translator enables a user to develop an algorithm via the Weka data mining tool and then to translate the output to be compatible as an input to WCPS. It is designed to run in an elastic compute cloud.
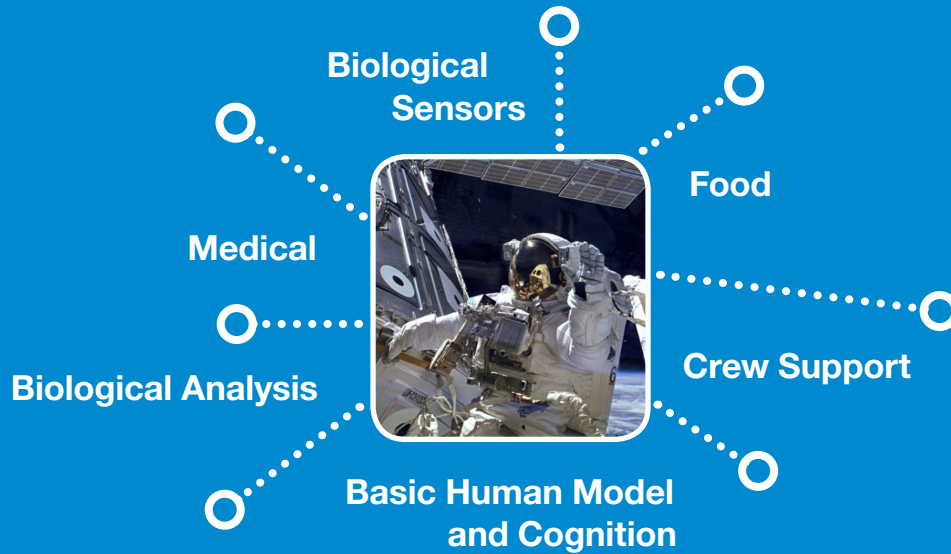
U.S. Government Purpose Release

Windows Semi-Markov Range Evaluator (WinSURE) LAR-16059-1

This package is used by aerospace flight software developers to predict the reliability of flight-critical computer processes.

U.S. Release Only

11

Crew and Life Support

Biological Sensors

Food

Medical

Crew Support

Biological Analysis

Basic Human Model and Cognition

Acute Radiation Risk and BRYNTRN
Organ Dose Projection (ARRBOD) GUI — MSC-24789-1

This graphical user interface (GUI) provides integrated input and output manipulations for ARRBOD's BRYNTRN and SUMDOSE computer codes (written in Fortran) and the Acute Radiation Risk (ARR) Probabilistic Response Model (written in C).
U.S. Government Purpose Release

Atomistic Simulation of Complex DNA DSBs
and the Interactions with the Ku70/80 Heterodimer — MSC-25180-1

This software assisted in the development of molecular dynamics simulations on a series of DNA duplexes with various complex lesions. The tool helped to investigate the effects of such lesions on the structural integrity and stability of DNA after it had been insulted by infrared radiation.
U.S. Government Purpose Release

Automated Behavior and Cohesion Assessment Tools — MSC-25508-1

This software effort has supported the conceptual design of a system to monitor crew health unobtrusively, identify potential abnormalities, and provide feedback to astronauts and flight surgeons.
U.S. Government Purpose Release

Bayesian Sleep Fusion — MSC-25622-1

Bayesian Sleep Fusion estimates a subject's actual sleep status over time by applying data fusion algorithms to data sets collected from multiple sleep data sources, including actigraphy, sleep diaries, direct observation, sleep schedules, work schedules, performance testing, and neurobehavioral testing. Particular embodiments assign data-error characteristics to each source, determine the likelihood of accurate correct sleep status reporting from each source, and apply Bayesian analysis to each source-specific likelihood to determine an overall sleep status estimate.
U.S. Government Purpose Release

DecomPose — MSC-25392-1

DecomPose is a library of routines used to compare two captured poses. The library requires the use of a Kinect sensor.
U.S. Government Purpose Release

Human Factors Analysis Support Tool (H-FAST), Version 2.0 — MSC-25653-1

H-FAST increases human factors awareness among design engineers, facilitates communication between human factors engineers and design engineers, and promotes the application of human factors best practices early in the design cycle. H-FAST also offers detailed guidance regarding human factors evaluations and provides the capability to store these evaluations.
U.S. Government Purpose Release

Human Research Roadmap (HRR) — MSC-25662-1

HRR is a Web-based, publicly accessible central repository of research being conducted to mitigate the human health risks involved in spaceflight missions. The tool provides detail on approaches, individual research efforts, and intended technology development activities.
U.S. Government Purpose Release

Integrated Cognitive Assessment Tool: Combining Person, System, and Mission — MSC-24791-1

In short, the Integrated Cognitive Assessment Tool yields quantified measurements of a person's cognitive ability to perform a specific job in space. The software integrates traditional cognitive performance measurements with assessments of the systems/missions in which an individual must operate.
U.S. Government Purpose Release

Integrated Medical Model (IMM)   MSC-25090-1

The Integrated Medical Model (IMM) is a decision-support tool for spaceflight mission planners and medical system designers. The tool assesses risks, provides rationale for in-flight medical capabilities, and designs medical systems for specified space flight missions. Offering an evidence-based approach, IMM optimizes resources within operational constraints.
U.S. Government Purpose Release

Integrated Modules to Estimate Space Radiation Risks   MSC-24789-1

This NASA-developed modeling software estimates the effects of radiation exposure on a human. Specifically, the tool provides estimations of effective whole-body dose, organ doses, and acute radiation sickness symptoms for astronauts should they be exposed to solar particle events during space exploration missions.
U.S. Government Purpose Release

Interface Anywhere: A Prototype Interface for the Development of a Gesture and Voice System   MSC-25672-1

The Interface Anywhere prototype can be used to develop and test gestures, voice commanding, and other alternative control inputs in a space habitat (e.g., an Environment Control and Life Support System).
U.S. Government Purpose Release

Kidney Stone Detection Using a Combined Method of B-Mode and Doppler Ultrasound, UW C4C Reference No. 45493   MSC-25189-1

This NASA algorithm first detects the outlier within a Doppler signal ensemble and then weights the magnitude of the outlier by the magnitude of the B-mode at the same point in space. Thresholding, color scaling, and spatial filtering are applied to output detection, and the information is overlaid onto the B-mode image in real time.
U.S. Government Purpose Release

Man-Machine Integration Design and Analysis System, (MIDAS) Version 5   ARC-16050-1A

MIDAS is a 3D rapid-prototyping human-performance modeling environment that facilitates the design, visualization, and computational evaluation of complex man-machine system concepts in simulated operational environments. The tool links a virtual human to a computational cognitive structure that represents human capabilities and limitations. MIDAS operates on a Microsoft Windows-based PC platform. An easy-to-use graphical user interface makes the software an accessible tool for designers; no expertise in computer science, programming, or human performance modeling is required.
U.S. and Foreign Release

Method for Relating Team Skills to Game Mechanics   MSC-25442-1

Three engaging prototype games have been developed to help exploration crews refresh their team skills. The elements of constructs and skills taxonomy have been mapped into a subset of game mechanics to serve as a set of requirements for game design.
U.S. Government Purpose Release

Multi-Attribute Task Battery (MATB-II)   LAR-17835-1

MATB-II is a computer-based task battery designed to facilitate research in human multiple task performance with consideration for the effects of automation. The tool includes five component tasks: system monitoring, tracking, communications monitoring, and resource management. A scheduling window provides preview of anticipated workload, and component tasks can be automated or manual. Coded in C++, MATB-II has been tested on the Windows XP Service Pack 3, Windows Vista, and Windows 7 operating systems.
General Public Release

Multi-Attribute Task Battery (MATB II) Event File Builder (EFBt)   LAR-17840-1

This standalone application allows a researcher to create and edit event files for the NASA MATB II task battery through a graphical interface. A scheduling window provides preview of anticipated workload. Component tasks can be automated or manual. EFBt generates event files in XML code; files can be coded and edited in a standard XML editor.
General Public Release

NASA Task Load Index (TLX)   ARC-15150-1

The NASA Task Load Index (TLX) provides multi-dimensional ratings of overall workload based on a weighted average of six subscales: mental demands, physical demands, temporal demands, performance, effort, and frustration.
General Public Release

Network-Form Game Software Library (libnfg)   ARC-16764-1

The libnfg software library describes how humans interact with their environment and with other humans. The tool provides a Monte Carlo analysis of user-specified "network-form games," which are flexible modeling methodologies that combine Bayes nets and game theory to model complex systems. Please visit the following URL to download the software: <https://sites.google.com/site/ritchielee/files>
Open Source

New Regime of Ultrasound Imaging of Strong Scatterers in Tissue Using Envelope-Based Beam Forming   MSC-25190-1

Sacrificing resolution quality, this tool improves the contrast between a kidney stone and other tissue in an ultrasound image.
U.S. Government Purpose Release

New Ultrasound Imaging Regime for Improved Size Measuring of Hard Concretions Present in Soft Tissues Based on Observation of Ultrasound Shadow on a B-Mode Image   MSC-25187-1

This NASA-developed technology improves kidney-size determination through ultrasound.
U.S. Government Purpose Release

POSTPROC User-Interactive Software for the Analysis of Human Physiological Data   ARC-15287-1

POSTPROC offers researchers and clinicians user-friendly software for processing and analyzing human physiological data. Measurements include electrocardiography, electromyography, respiration, beat-to-beat blood pressure, skin temperature, blood volume pulse, skin conductance levels, and cardiovascular dynamics derived from impedance. The customized application runs under DADiSP/2002, a commercially available engineering spreadsheet from DSP Development Corporation.
U.S. Government Purpose Release

Real-Time Kidney Stone Tracking Algorithm   MSC-25192-1

A software component of the Rolling Stones prototype, this algorithm uses focused ultrasound to clear stones from a kidney. The tool processes a series of B-mode images to track a region of interest, offers visual feedback of position location to the user, and targets a stone for automated adaptive pushing. The algorithm uses a colored display scheme to report a confidence estimation of stone location.
U.S. Government Purpose Release

Relativistic Ion Tracks (RITRACKS)   MSC-25076-1

Relativistic Ion Tracks (RITRACKS) was developed to provide a better understanding of the initial interactions of heavy ions with matter. A Monte-Carlo code simulates the production of radiolytic species in water and follows the different types and energies of simulated ion tracks.
U.S. Government Purpose Release

Semantic Language and Tools for Reporting Human Factors Incidents
MSC-25200-1

This NASA software development effort seeks to combine semantic Web technologies with automated assistive technologies to aid users in finding relationships among incidents. Phase I defined a semantic language for incident reporting in XML and designed a technology approach for authoring and utilizing incident reports represented in XML. Phase II consists of implementing the software and evaluating its effectiveness.
U.S. Government Purpose Release

Spaceflight Dietary Intake
MSC-25693-1

This technology allows a crew to record dietary intake quickly and accurately.
U.S. Government Purpose Release

Spinal Ultrasound Just-in-Time Training Tool
MSC-25501-1

Augmenting/reducing required Earth-based training and enhancing ultrasound-image reproducibility, this NASA-developed tool provides crewmembers with a review of anatomical landmarks and experimental protocols.
U.S. Government Purpose Release

Spine Elongation Prevention and Exercise Device for Microgravity Environment
MSC-25654-1

This technology is being designed to prevent the spinal column lengthening and spinal column bone loss that can occur in a microgravity environment.
U.S. Government Purpose Release

Ultrasound Technique to Separate Hard Objects from Tissue by the Long-Lasting Reverberation in Hard Objects
MSC-25188-1

The ultrasound imaging of hard objects creates a reverberant signal, whereas imaging tissue does not. This technology development effort has sought to exploit that difference to improve kidney stone detection.
U.S. Government Purpose Release

Virtual Reality Trainer
MSC-25570-1

In order to help International Space Station crewmembers maintain EVA proficiency and train for contingency repairs, NASA has developed the Virtual Reality Trainer. The tool incorporates a unique optical system and makes use of the already successful Dynamic Onboard Ubiquitous Graphical (DOUG) software.
U.S. Government Purpose Release

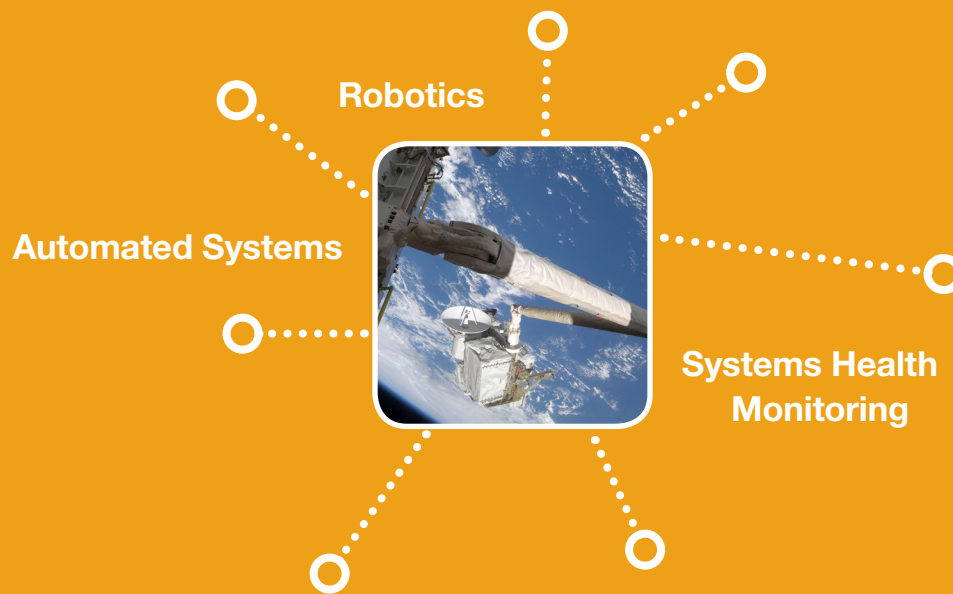### Virtual Team Training Engine and Evaluation Framework
MSC-25445-1

This technology offers a framework for constructing virtual training scenarios rapidly, executing those scenarios, and measuring their effectiveness. Output from the scenario design tool is directly imported into a 3D virtual team-training engine that allows players to engage from a variety of platforms. The after-action review feature offers relevant, on-the-fly training material that will further educate each player in areas that warrant improvement.
U.S. Government Purpose Release

12

Autonomous Systems

Robotics

Automated Systems

Systems Health Monitoring

ACCoRDs Conflict-Detection (CD3D)/Conflict-Resolution (CR3D) Algorithms   LAR-17878-1

Written in Java and C++ and based on the Airborne Coordinated Conflict Detection and Resolution mathematical framework, CD3D and CR3D are prototype implementations of state-based conflict-detection and conflict-resolution algorithms for a 3D airspace.
Open Source

Adaptive Sensor Fleet (ASF)   GSC-15033-1

The Adaptive Sensor Fleet is a supervisory control system that uses a collection of heterogeneous robotic platforms to perform observations of dynamic environments. Goals can include: supervisory fleet management of robotic platforms (coordination); analysis of environmental science data for use in the decision-making process (collaboration); optimal path planning and re-planning; identification of science phenomena; and adaptation to dynamic or unknown environments.
U.S. Government Purpose Release

Aircraft VOrtex Spacing System (AVOSS) Wake Vortex Prediction Algorithm   LAR-16401-1-NP

The AVOSS Wake Vortex Prediction Algorithm (APA) provides time histories of position and circulation strength for a pair of aircraft wingtip vortices. Physical aircraft parameters such as weight, wingspan, and airspeed, along with profiles of ambient winds, temperature, and turbulence, are used as input to the algorithm. The output is a file with lateral and vertical position and circulation strength over a period of time for each wingtip vortex. The algorithm is a semi-empirical, analytic model of wake behavior. Predictions can be generated on the order of seconds, making the algorithm useful for real-time wake avoidance.
U.S. Release Only

Automated Evaluation Software (AES) Web Application   GSC-16544-1

AES allows source evaluation boards to enter, modify, and rate vendor proposals against a request for proposal (RFP). Created using modern Java enterprise technologies, the tool provides Microsoft output and dynamic report generation. The user interface is compatible with both Internet Explorer and Firefox. A Tomcat application server makes the application robust, fast, and reliable.
U.S. Government Purpose Release

Automated Nonconformance System   SSC-00054

The Automated Nonconformance System records and tracks rocket engine inspections and repairs. The technology will also perform audits, ensuring that hardware is not shipped until it is properly processed and documented.
U.S. Government Purpose Release

Automated Segmentation of Insulin Granules from Scanning Electron Micrographs (SEM) of Rat Pancreatic Beta Cells   GSC-15074-1

This technology offers a data-driven image-processing approach that provides rapid and accurate determination of granule numbers, locations, and potential gradients in a pancreatic beta cell under different experimental conditions.
U.S. Government Purpose Release

Automation Framework Designed for Flight Dynamics Products Generation (XFDS)   GSC-15618-1

This software framework automates the generation of flight dynamics products by providing a unified and consistent graphical interface to various tools. The technology coordinates the execution of applications such as Satellite ToolKit, FreeFlyer, and MATLAB; allows for the embedding of Perl code; provides a mechanism for passing messages between a collection of XFDS processes; and allows GMSEC messages to be sent and received. Automation configuration is stored in text files and can be edited directly or by using graphical editors implemented for each tool.
U.S. Government Purpose Release

Collaborative Communication Framework for Multi-Agent Systems GSC-15123-1

Adaptable and self-organizing, this agent-awareness technology employs a virtual 3D concept to apply a framework to the NASA Goddard Space Flight Center (GSFC) tetrahedron structure developed under the Autonomous Nano Technology Swarm (ANTS) program and the Super Miniaturized Addressable Reconfigurable Technology (SMART) architecture program.
U.S. Government Purpose Release

Conflict Prevention Bands LAR-17874-1

Conflict prevention information has been assembled into prevention bands that advise a crew on maneuvers that should not be taken, helping to ensure that an aircraft's path is free of conflicts with other aircraft.
Open Source

Evolvable Neural Software System (ENSS) GSC-14657-1

Inspired by psychology, this collection of algorithms could be key to research in autonomous spacecraft, nano-robotic swarms, and sensor networks. The technology allows intelligent systems to identify and correct unpredictable or unstable behaviors; create stable "emotional states" that govern behaviors with given specific circumstances; and establish an evolvable synthetic neural network that can eventually be scaled from low-level functions to higher level decision-making processes.
U.S. Release Only

Extendable Uniform Remote Operations Planning Architecture (EUROPA) 2.1 ARC-15936-1

EUROPA is a general-purpose, reusable, artificial intelligence software system. The tool generates plans for performing complex activities in parallel. Functionality includes the capability of verifying that a plan satisfies all constraints. EUROPA can be downloaded at: <http://code.google.com/p/europa-pso/wiki/EuropaWiki>
Open Source

Formation Flying Test Bed (FFTB) GSC-15116-1

The Formation Flying Test Bed (FFTB) at NASA's Goddard Space Flight Center (GSFC) provides a hardware-in-the-loop test environment for formation navigation and control. A message-oriented middleware architecture and a software crosslink for inter-spacecraft ranging have been added to the FFTB.
U.S. Government Purpose Release

Framework and Methodologies for Intelligent Integrated Health Management Systems (IIHMS) SSC-00234

Throughout the rocket engine testing process, the IIHMS architecture, framework, and methodologies determine the operational condition of all system-of-systems elements (e.g., sensors, processes, and components).
U.S. Government Purpose Release

Gold Standard Test Set (GSTS) GSC-15873-1

The GSTS ground support equipment verifies that a command, control, communications, and intelligence (C3I) system complies with the interoperability standards for radio links and Ethernet interfaces. The technology, which does not check content, has been used to verify the interoperability protocols (language only) between Constellation systems.
U.S. Government Purpose Release

Hazards Analysis Management Tool (HAMT) GSC-16846-1

HAMT uses a single software tool to increase the efficiency and effectiveness of hazard analyses. Composed of a Microsoft Access front-end (that contains the user interface) paired with a Microsoft Access back-end (that stores analysis data), the software can be used to enter, edit, and report information throughout the hazard analysis lifecycle.
U.S. Government Purpose Release

Jet Propulsion Laboratory (JPL) Stereo Vision Software Suite (JPLV)　　　JPL-18593

JPLV provides a set of libraries and utilities for basic robotic vision, including stereo ranging and camera calibration. Primarily intended for vision system users rather than vision system developers, the suite hides most implementation details behind a high-level application user interface. No specialized computer-vision knowledge is required.
U.S. Government Purpose Release

K9 Rover Control Software　　　ARC-14587-1

This NASA technology contains the low-level driver code that controls hardware components (e.g., motors, power supply, cameras, and frame-grabbers) of the K9 rover; the code for implementing support utilities (e.g., thread queues); and the code that supports visual serving.
U.S. Government Purpose Release

K10 Robot Controller　　　ARC-15762-1

This embedded system controller operates the K10 mobile robot. The technology is written in C++, runs on Linus computers, executes in soft real time, and is based on the NASA Coupled Layer Architecture for Robotic Autonomy (CLARAty) robot-control architecture. For localization and short-range safeguarding, the controller processes data from numerous sensors, including ultrasonic sonar, optical tracking, and wheel encoders.
U.S. Government Purpose Release

Livingstone 2 (System for Automated Diagnosis and Discrete Control of Complex Systems) and Skunkworks (Suite of Supporting Development and Runtime Tools)　　　ARC-14725-1

Livingstone 2 is a reusable artificial intelligence (AI) software system designed to assist spacecraft, life support systems, chemical plants, or other complex systems in operating robustly with minimal human supervision, even in the face of hardware failures or unexpected events. The technology diagnoses the current state of a spacecraft or other system and recommends commands or repair actions that will allow the system to continue operations. A re-engineered version of the Livingstone diagnosis system that was flight-tested onboard the Deep Space One spacecraft in 1999, Livingstone 2 contains significant enhancements to robustness, performance, and usability.

Skunkworks is a suite of software tools that support the rapid deployment of model-based representations of complex systems for Livingstone2 via a visual model builder/tester and two graphical user interface tools that provide status information during testing.
Open Source

Mission Analysis Low-Thrust Optimizer (MALTO)　　　JPL-43625

MALTO is a software tool for preliminary design and optimization of low-thrust interplanetary trajectories. The tool is easy to use, has robust convergence, and can handle many intermediate encounters.
U.S. Government Purpose Release

Mission Simulation Toolkit (MST)　　　ARC-14932-1

MST offers a simulation framework to support research in autonomy for remote exploration. The system allows developers to test models in a high-fidelity simulation and then evaluate system performance against a set of integrated, standardized simulations. For more information, please visit: <http://ti.arc.nasa.gov/opensource/projects/mission-simulation-toolkit/>
Open Source

Model-Based Diagnosis Engine For Stochastic Hybrid Systems (HyDE)　　　ARC-15570-1A

HyDE is a model-based diagnostic engine capable of detecting and isolating discrete (possibly multiple) faults in physical systems. The current version of HyDE has been implemented in C++. Please visit the following URL for more information: <http://ti.arc.nasa.gov/tech/dash/diagnostics-and-prognostics/hyde-diagnostics/>
U.S. and Foreign Release

Motion Imagery and Robotics Application (MIRA)
MSC-25164-1

MIRA integrates spacecraft monitoring and control (SM&C), the Asynchronous Messaging Service, (AMS), and the Delay-Tolerant Network (DTN) into a single integrated protocol system capable of running on an International Space Station (ISS) payload computer.
U.S. Government Purpose Release

Mystic Low-Thrust Trajectory Design and Visualization Software
JPL-43666

Mystic provides very high-fidelity optimization of low-thrust spacecraft trajectories for mission design. The software can be used for general body-centered trajectories, interplanetary trajectories, and trajectories that combine body-centered and interplanetary trajectory legs. Mystic will also provide navigational/operational support for low-thrust spacecraft.
U.S. Government Purpose Release

Pandora Operation and Analysis Software
GSC-16080-1

This NASA-developed software controls Pandora instruments in the field to make them operationally autonomous. The software has a graphical interface that ensures that all functions are easily accessible to the user. The software can reduce raw data into a preliminary scientific product for quick-view purposes.
U.S. Government Purpose Release

Perl Data Tools
GSC-14388-1

This set of Perl scripts allows a software engineer to build systems to fully automate tasks. All tools are free, portable, and easy to understand and maintain. Prior technologies have utilized expensive databases, complicated client-server code (C, C++, and Java), and hard-to-control and hard-to-maintain rule-based systems.
U.S. Government Purpose Release

Planetary Observer Planning Software (POPS)
JPL-45418

The POPS application suite performs mission design analysis of a spacecraft orbiting a terrestrial planet. POPS is not intended for the study of hyperbolic or interplanetary orbits, although some limited hyperbolic capabilities exist.
U.S. Government Purpose Release

Planning and Control Toolkit for Dual-Arm Manipulation
MSC-25463-1

A suite of planning and control algorithms enables NASA robots to perform complex manipulations in a coordinated way—both autonomously and when operating under remote supervision.
U.S. Government Purpose Release

Robot Application Programming Interface Delegate (RAPID), Version 2
ARC-16368-1A

RAPID is a software reference implementation framework for remote operations. The technology promotes interoperability between robot software modules and includes a standard programming interface and data distribution middleware. RAPID facilitates integration of experimental robot software modules created by a distributed development team; improves the compatibility and reusability of robotic functions; and offers speed prototype robot development in a wide range of configurations and environments. For more information, please visit: <https://sourceforge.net/projects/robotapi/>
Open Source

Rocketdyne Automated Management System (RAMS) Upgrade
SSC-00207-1

This technology upgrades and expands the efficiencies of the Rocketdyne Automated Management System (RAMS), which has been used to streamline the maintenance procedures of ground support equipment (GSE) at Stennis Space Center test sites. RAMS improves work instruction accuracy, documents availability, and offers an overall work control system that has enhanced productivity and product quality.
U.S. Government Purpose Release

Room Alert Adapter, Version 1.0   GSC-16167-1

This adapter translates room-alert Simple Network Management Protocol (SNMP) messages, allowing GMSEC-compliant components to receive/monitor alarms or sensor values issued from a room-alert device.
U.S. Government Purpose Release

Rover Software (RoverSW), Version 1   ARC-16453-1

RoverSW is a modular, extensible framework for exploration robots. The technology allows developers to write reusable and scalable robot applications with minimal dependencies on the underlying robotic hardware. RoverSW's core provides the basic primitives for building a service-oriented robotics architecture and for distributing data using high-performance middleware. Modules for autonomous navigation, obstacle avoidance, basic sequencing, and remote operations are also included. The initial release of RoverSW includes support for the commercial, off-the-shelf components of Ames Research Center's K10 research robot series.
Open Source

Runway Incursion Prevention System (RIPS) Software   LAR-16544-1

The objective of RIPS is to improve runway incursion avoidance and detection capabilities. The real-time software system has been developed for use on aircraft operating on or near airport surfaces. RIPS improves the following elements of situation awareness for pilots: own-ship position awareness, traffic awareness, route awareness, route deviation detection, and runway incursion detection. The software system supports the first three elements by providing information to pilots via a Head-up Display (HUD) and an Electronic Moving Map (EMM) display. The last two elements are supported by monitor functions within the system that, on detection, generate audible alerts that are presented on the HUD and EMM displays.
U.S. Release Only

Simple, Scalable, Script-Based Science Processor for Missions (S4PM)   GSC-14841-1

S4PM is a set of Perl scripts that implement a data-driven processing system that executes science algorithms automatically as new data arrive. S4PM includes a graphical user interface for monitoring algorithms and the overall system for failures. The Perl scripts can currently process data from the Moderate Resolution Imaging Spectroradiometer and the Atmospheric Infrared Sounder, but the technology can be extended to process data from other missions if desired. Please visit the following URL for more information: <http://opensource.gsfc.nasa.gov/projects/s4pm/>
Open Source

Small Body Navigation and Topography (SBN&T)   JPL-41647

SBN&T provides an integrated program for the spacecraft navigation and determination of small-body dynamics, shape, and high-resolution topography. Multiple-image stereography and photoclinometry are used to construct high-resolution topographic and albedo maps centers treated as control points. These landmark maps are re-illuminated and correlated with images to act as body-fixed navigation tie-points.
U.S. Government Purpose Release

Speed Control Law for Aircraft Merging in the Terminal Area   LAR-17167-1

This software application uses airplane-to-airplane data-link information to calculate a speed command that allows an airplane to merge behind and then follow another airplane. This speed guidance provides a precision-spacing capability that could reduce an air traffic controller's tactical workload while increasing aircraft efficiency in terminal areas (i.e., increases landing rates/reduces delays) at busy airports during periods of high demand.
U.S. and Foreign Release

Strategic Conflict Resolution (Stratway)   LAR-17876-1

Stratway modifies a four-dimensional (latitude, longitude, altitude, and time) flight plan to ensure a conflict-free trajectory. This type of resolution is strategic in that it resolves conflicts over long time horizons, perhaps over several hours.
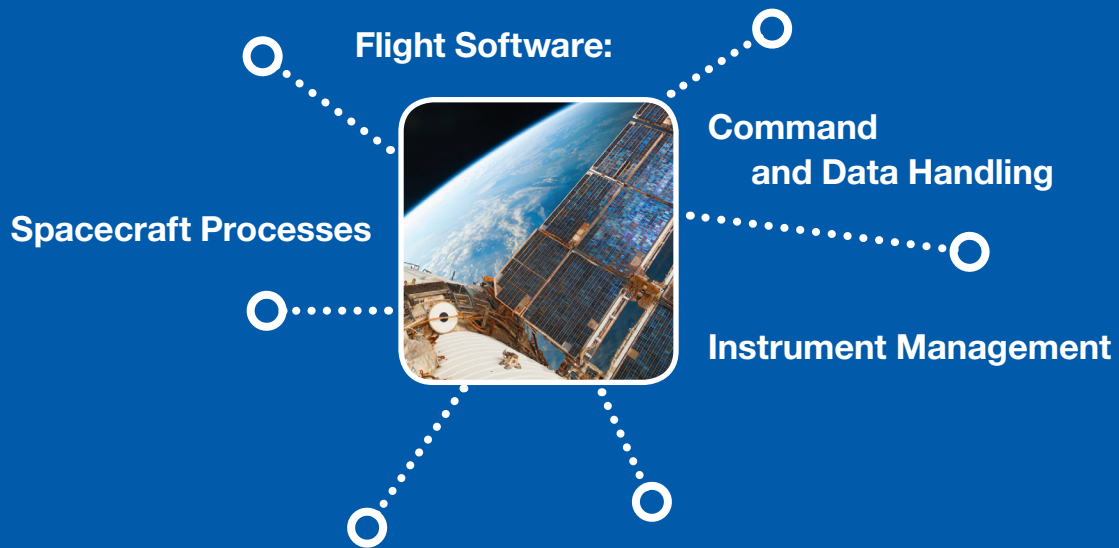**Open Source**

TurboTech Technical Evaluation Automated System   GSC-15554-1

Using an "interview" process through which an evaluator answers a series of questions, TurboTech simplifies and semi-automates the more structured portion of a technical evaluation. The software also provides definitions and plug-in paragraphs to assist in writing evaluations.
U.S. Government Purpose Release

13

Vehicle Management
(Space/Air/Ground)

Flight Software:

Command
and Data Handling

Spacecraft Processes

Instrument Management

Alternative Flight Software Trigger Paradigm—Applying Multivariate Logistic Regression to Sense Trigger Conditions Using Inaccurate or Scarce Information — MSC-25684-1

Helping Guidance, Navigation, and Control (GN&C) engineers to develop robust flight software tools, this innovation allows an autonomous vehicle to trigger certain actions.
U.S. Government Purpose Release

Autonomous Flight Safety System — GSC-15549-1

The Autonomous Flight Safety System replaces the human element of range safety operations and reduces reliance on expensive down-range assets. The system provides a highly reliable platform consisting of multiple navigation sensors and flight computers.
U.S. Release Only

Autonomous Landing Hazard-Avoidance Technology (ALHAT) Scanning Lidar-Based Simulation for Mars Landing — JPL-21220

The ALHAT simulation tool provides an efficient software model and a set of algorithms in C++ code for performing scanning lidar-based hazard detection and avoidance.
U.S. Government Purpose Release

Automated Planning and Scheduling Environment (ASPEN) — JPL-41986

ASPEN automates space mission planning and other tasks that involve the reasoning of time, states, resources, and actions.
U.S. Government Purpose Release

Basic Operational Robotics Instructional System (BORIS) — MSC-24850-1

BORIS is an introductory robotics training system for flight crews, flight controllers, and robotics instructors. The technology combines forward and inverse kinematic algorithms to simulate joint and end-effector motion together with a multi-body dynamics model, a moving-object contact model, and X Windows-based graphical user interfaces.
U.S. Government Purpose Release

Command Management System (CMS) — GSC-14798-1

The CMS is an essential element of the Mission Operations Center (MOC) for NASA's scientific satellites. The system enables efficient and safe operation of commanding functions for a given mission. On the ground, the CMS has the prime responsibility of coordinating the collection and merging of spacecraft and instrument commands from various sources and performing functions related to the management and use of stored command processor memory onboard a spacecraft.
U.S. Government Purpose Release

Component Object Model (COM+) Simulation Architecture With Application to Tethers and Formation Flying — GSC-14970-1

The COM+ spacecraft simulation architecture enables the user to build COM components that can be assembled into a spacecraft simulation without the need for re-compiling or re-linking. The advantages of using COM components result directly from their ability to be dynamically plugged into and unplugged from a spacecraft simulation. This type of architecture provides for rapid assembly by enabling components (representing the environment, sensors, actuators, dynamics, and control) to function as distributed processes across networks.
U.S. Government Purpose Release

Core Flight Executive (cFE)
Version 5.0   **GSC-15144-1**
Version 6.0   **GSC-16232-1**

The Core Flight Executive (cFE) provides software bus, time, event, executive, table, and file services, and it defines the application programming interface (API) for each set function. Applications subscribe to cFE services at runtime, making system modifications easy. Facilitating rapid prototyping, new applications can be compiled, linked, loaded, and started without requiring the entire system to be rebuilt.
U.S. Government Purpose Release

Core Flight Executive (cFE) Application Programming Interface (API)   **GSC-15157-1**

The cFE API specifies function name, required parameters, and function return information.
Open Source

Core Flight Executive/Core Flight System (cFE/CFS) Evolution for Multi-Core Platforms   **GSC-16857-1**

This development effort modified cFE/CFS flight software components to enable them to run on a multi-core processor or an embedded operating system that supports multi-core processors (e.g., VxWorks 6 and Linux). Modified components included: the Operating System Abstraction Layer (OSAL), the Core Flight Executive (cFE), and parts of the Core Flight System (CFS). These modifications did not add any additional application functionality to the Operating System Abstraction Layer OSAL or the cFE.
U.S. Government Purpose Release

Core Flight System (CFS) CFDP, Version 2.0   **GSC-16125-1**

The CFDP application provides the capability to transmit and receive files to/from the ground. Tables are used to allow flexibility in specifying directory priorities and configurations.
U.S. Government Purpose Release

Core Flight System (CFS) Checksum Application
Version 1.0   **GSC-15736-1**
Version 2.0   **GSC-15996-1**

Checksum (CS) is one of the reusable applications that make up the Core Flight System (CFS). The technology performs memory integrity management by verifying the contents of critical flight memory regions. Unexpected changes in memory (i.e., due to an SEU) are reported to ground operators.
U.S. Government Purpose Release

Core Flight System (CFS) Data Storage (DS) Application
Version 1.0   **GSC-15776-1**
Version 2.0   **GSC-16126-1**

The DS application provides the ability to store data (i.e., messages) into files. Tables are used to provide the flexibility for specifying messages.
U.S. Government Purpose Release

Core Flight System (CFS) File Manager (FM) Application
Version 1.0   **GSC-15748-1**
Version 2.0   **GSC-16007-1**

FM provides the user commands to perform the following operations: copy file, move file, rename file, delete file(s), close file, concatenate file, decompress file, delete directory contents, create directory, remove directory, obtain file information, obtain open file listing, and obtain directory listings.
U.S. Government Purpose Release

Core Flight System (CFS) Health and Safety Application, Version 2.0   GSC-16151-1

The plug-and-play CFS Health and Safety application is compatible with the Core Flight Executive (cFE) and uses the Operating System Abstraction Layer (OSAL), both of which were developed by Goddard Space Flight Center in order to provide a reusable, platform-independent, mission-independent, layered architecture for hosting applications. The technology can be used for any government or commercial spacecraft. Please visit the following URL for additional information: <http://sourceforge.net/projects/coreflightexec/files/cFE-6.1.1/>

U.S. Government Purpose Release

Core Flight System (CFS) Housekeeping (HK) Application

Version 1.0	**GSC-15768-1**
Version 2.0	**GSC-16127-1**

The CFS Housekeeping application provides the ability to organize data from various packets into new packets in order to best utilize the telemetry bandwidth available for a mission.

U.S. Government Purpose Release

Core Flight System (CFS) Limit Checker (LC) Application

Version 1.0	**GSC-15746-1**
Version 2.0	**GSC-16010-1**

The Limit Checker (LC) application is responsible for monitoring telemetry values.

U.S. Government Purpose Release

Core Flight System (CFS) Memory Dwell Application

Version 1.0	**GSC-15735-1**
Version 2.0	**GSC-16012-1**

The Memory Dwell application telemeters the contents of table-defined addresses at a table-defined dwell rate. Addresses can be processed using symbols if the target processor/operating system includes symbols.

U.S. Government Purpose Release

Core Flight System (CFS) Memory Manager Application

Version 1.0	**GSC-15725-1**
Version 2.0	**GSC-16011-1**

The Memory Manager application processes commands, generally from the ground, in order to dump the contents of a memory location, dump the contents of a range of memory locations, load a memory location with specified data, load a range of memory with specified data, or fill an area of memory with the specified fill pattern. Operations can be performed on non-volatile, volatile, and memory mapped I/O.

U.S. Government Purpose Release

Core Flight System (CFS) Scheduler Application

Version 1.0	**GSC-15754-1**
Version 2.0	**GSC-16123-1**

The Scheduler application uses a one-second major timeframe, which is divided into a designer-determined collection of equally divided minor timeframes. The technology is configurable and table-driven to provide greater flexibility.

U.S. Government Purpose Release

Core Flight System (CFS) Software Bus Network (SBN) Application, Version 1.0   GSC-16917-1

The SBN serves as a plug-in to the cFE framework to transfer messages across process/processor interfaces. The technology has three primary functions: to establish and maintain a connection to each peer over available process/processor interfaces; to distribute and maintain a subscription message database for each peer; and to distribute messages to peers that have subscribed to message identifiers.

U.S. Government Purpose Release

Core Flight System (CFS) Stored Command (SC) Application

| Version 1.0 | GSC-15745-1 |
| Version 2.0 | GSC-16009-1 |

The CFS SC application provides the ability to execute onboard absolute-time and relative-time command sequences. The technology offers a generic implementation that can be configured by a user to fit the needs of a specific mission.

U.S. Government Purpose Release

Data Trending and Analysis System, Version 4.0   GSC-14751-1

The client/server-based Data Trending and Analysis System, which can be exported to Excel or to a text file, archives and then analyzes spacecraft health and safety telemetry. The system provides various tools for viewing, plotting, and analyzing engineering data, and it allows for selective sub-setting of data for analyzing specific points of interest. An optional tool for power system analysis is also provided.

U.S. Government Purpose Release

Experiment in Onboard Synthetic Aperture Radar (SAR) Data Processing With Radiation Hardening by Software on Tilera Multicore Processor   GSC-15757-1

This standard C-language implementation of Synthetic Aperture Radar (SAR) data processing is distributed over many cores of a Tilera processor and employs novel Radiation Hardening by Software (RHBS) techniques designed to protect component processes and their shared application memory from the single-event upsets expected in the space environment. The source code includes calls to Tilera application programming interfaces and a specialized Tilera compiler for producing a Tilera executable.

U.S. Government Purpose Release

General Mission Analysis Tool (GMAT)   GSC-15132-1

Fully platform independent, GMAT has been designed for intuitive use from both a graphical user interface and a script language similar to MATLAB. The technology's propagation abilities allow for the coupled dynamics of multiple spacecraft in multiple flight regimes.

U.S. Release Only

International Space Station (ISS) Robotics Planning System (RPS) Software Suite   MSC-25639-1

The RPS suite is used by Robotics Flight Controllers to show graphical representations of ISS robotics arm activities following flights. The technology is also used as an independent graphical simulation for pre-flight robotics activities.

U.S. Government Purpose Release

Lunar Reconnaissance Orbiter (LRO) Spacecraft Flight Software   GSC-16103-1

LRO Spacecraft Flight Software controls and coordinates all aspects of the Orbiter's operation in nominal and anomalous conditions. It distributes commands to, and collects data from, all spacecraft subsystems and all seven instruments; communicates with the ground controllers in real time to receive commands and send housekeeping telemetry data through the S-band RF links; sends science data using the class-2 CCSDS File Delivery Protocol (CFDP) over the Ka-band RF link; and monitors the health of various Orbiter subsystems and takes corrective actions as necessary.

U.S. Government Purpose Release

Magic Bullet Adaptive Intelligent Vehicle Health Management (AIVHM) System   GSC-15147-1

Based on treatment learning and Bayes classification technology, the "Magic Bullet" Adaptive Intelligent Vehicle Health Management (AIVHM) system offers a novel adaptive control system for sounding rockets.

U.S. Government Purpose Release

Magnetosphere Multi-Scale (MMS) Spacecraft Flight Software
GSC-16471-1

This spacecraft flight software was developed to support unique multi-satellite MMS mission requirements. The technology interfaces to a sensor/actuator complement that includes a star sensor and Digital Sun Sensor, Accelerometer, and Thruster hardware to implement the functionality for determining and controlling spacecraft attitude and orbit.

U.S. Government Purpose Release

MAVEN Flight and Ground Software
GSC-16866-1

This software includes the flight code embedded in the flight processor on the spacecraft; the simulation models and executive code that executes in the Spacecraft Test Lab; the simulation models and executive code that executes in the SoftSim test bed; unit-level test code; test scripts to execute test runs in the test beds; and the software used to test avionics boards and support ATLO testing.

U.S. Government Purpose Release

Mercury Laser Altimeter (MLA) Onboard Science Algorithms Reusable Software
GSC-14876-1

By using range information provided by a spacecraft and noise counts from instrument hardware, the MLA science algorithms control the altimeter by dynamically modifying hardware inputs for the gain, the threshold, the channel disable flags, the range window start location, and range window width. The technology has three major modes of operation: fixed, range-driven, or self-adaptive.

U.S. Government Purpose Release

Multi-Mission Attitude Determination System (ADS-MATLAB)
GSC-14471-1

This multi-mission GUI-based attitude determination system is implemented in MATLAB. The technology includes a user-developed front-end, a data adjuster that transforms raw telemetry to vectors in body coordinates, a direct-match and pattern-match star identification module, a single frame (QUEST) attitude estimator, an onboard computer-ground attitude comparison tool, and a set of sensor calibration utilities.

U.S. Government Purpose Release

Multi-Mission Three-Axis Stabilized Spacecraft (MTASS) Attitude Determination and Sensor Calibration System
GSC-15811-1

Unlike single-purpose ground support systems, which attempt to reduce costs by reusing software specifically developed for previous missions, this development effort is an intermediate step in the progression to a single fully generalized mission support system that could be used for numerous missions.

U.S. Government Purpose Release

Multiple-Force Vector and Field Detection and Measurement Through a Flexible Medium
MSC-25704-1

This innovation can be used as a tactile human-machine input device or as a tool to improve the grasping quality of robot manipulators. Incipient slip, sample stiffness, and tangential force vector parameters are extracted and used in high-level control algorithms to drive a robotic arm.

U.S. Government Purpose Release

NanoSat Launch Adapter System (NLAS)
ARC-16732-1

NLAS maximizes the efficiency of satellite launch opportunities. The technology acts as a "spacer" between the rocket and the primary spacecraft. NLAS consists of three main subsystems: the Adapter, the Dispenser, and the Deployment Sequencer. Each subsystem can be configured to meet the specific needs of a given launch.

U.S. Government Purpose Release

Onboard Short-Term Plan Viewer (OSTPV), Version 4.0   MSC-24832-1

Innovators at NASA Johnson Space Center have developed a Web-based application to support the International Space Station (ISS) program's real-time operations. The Onboard Short Term Plan Viewer (OSTPV) contains the integrated ISS mission schedule in use at NASA Mission Control Center (MCC) and onboard the ISS. OSTVP displays all ISS activities (onboard and on the ground) in an integrated timeline.
U.S. Government Purpose Release

Operating System Abstraction Layer (OSAL)   GSC-14921-1

The OSAL library isolates embedded application software from a Real-Time Operating System (RTOS). The technology provides a well-defined, generic interface to RTOS services; a generic interface to hardware services; and an implementation for several current RTO systems. By using the library, an embedded application can remain portable among multiple operating systems on multiple platforms. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/osal/>
Open Source

Orion Guidance, Navigation & Control Flight Software   MSC-25615-1

The Orion Crew Exploration Vehicle's onboard Guidance, Navigation & Control (GN&C) flight software has been developed to a class-A, human-spaceflight-ready standard. The technology uses a MATLAB/Simulink tool suite to embrace a model-based development approach.
U.S. Government Purpose Release

PredGuid+A: Orion Entry Guidance Modified for Aerocapture   MSC-25199-1

The Orion PredGuid entry guidance computer code has been interfaced with the Simulation and Optimization of Rocket Trajectories (SORT) and modified to enable aerocapture. The resulting code, PredGuid+A, allows the user to set a mode flag, input a target orbit's apoapsis and periapsis, and use bank-angle control to guide a vehicle to the appropriate post-aerocapture orbit using either the Apoapsis Targeting or Delta-V Minimization algorithms.
U.S. Government Purpose Release

Range Data Acquisition Computer (RADAC) System   GSC-14974-1

The Range Data Acquisition Computer (RADAC) system is used to process flight vehicle metric data for real-time display in the Wallops Flight Facility Range Control Center (WFF RCC) and Mobile Control Center (MCC). It is an integral part of the overall Range Control/Range Safety System used to contain impacting debris from flight vehicle operations. As part of an upgrade effort, a modular software object library was developed to implement required vehicle tracking data filtering and tracking data source management functionality. The library has been constructed in such a way as to easily accommodate future implementations and integration of other, more exotic filtering techniques. Developed using modern object-oriented software practices in ANSI-compliant C++, the library can be hosted within an application running on virtually any computing platform.
U.S. Government Purpose Release

Range Safety Algorithm Software Module for an Autonomous Flight Safety System   GSC-15594-1

This software library was developed to mitigate the public safety risks of hazards associated with the flight of expendable launch vehicles and other unmanned flight vehicles. The software encapsulates the various constructs and algorithms required to accomplish Time Space Position Information (TSPI) data management from multiple tracking sources. At its core, the technology evaluates various user-configurable rule sets that govern the qualification of TSPI data sources; provides a pre-launch autonomous hold-launch function; performs flight-monitoring/flight-termination functions; and provides end-of-mission safing.
U.S. Government Purpose Release

Range Safety Flight Elevation Limit Calculation Software (ElLimits) GSC-16692-1

The ElLimits program is used to configure launch-phase range safety flight control lines for guided missiles. The user specifies the extents and resolution of a grid in the vertical plane oriented along the launch azimuth. At each grid point, the program computes the maximum velocity vector flight elevation that can be permitted without endangering a specified back-range location. Vertical plane x-y limit lines are derived from the flight elevation limit data by numerically propagating "streamlines" through the grid.
U.S. Government Purpose Release

ROAMS Rover Analysis and Modeling Software JPL-30722

ROAMS is a planetary rover simulation software package. The technology consists of mechanical models of a rover, instrument arms, actuators and sensors, power resources, terrain interactions, and onboard software.
U.S. Government Purpose Release

Rock Identification Toolkit (RockIT) JPL-41133

RockIT is an interactive tool used by mission scientists to identify and characterize rocks and rock distributions.
U.S. Government Purpose Release

Software Applications for the Control and Management of the Amine Swingbed Experiment MSC-25526-1

This disclosure covers the following software components: the Swingbed Loader Computer Software Configuration Item (CSCI), the Swingbed Control Module (CSCI), and the Swingbed Ground Controller. As a whole, the Amine Swingbed Experiment is investigating the removal of carbon dioxide from the International Space Station breathing environment via a system of a vacuum-regenerated amine pressure swing absorption reaction beds. Please visit the following URL for additional information: <http://www.nasa.gov/mission_pages/station/research/experiments/Amine_Swingbed.html>
U.S. Government Purpose Release

Space Network Access System (SNAS) GSC-16844-1

SNAS is a single, universally accessible, standards-based, and full-featured customer interface for performing Tracking and Data Relay Satellite System (TDRSS) planning, scheduling, and real-time service monitoring and control. The technology consolidates the functionality of multiple legacy customer interface systems into a single tool. SNAS is the primary access system for managing TDRSS resources.
U.S. Government Purpose Release

Spacecraft Parameter Database Tool (PDBT) GSC-16779-1

PDBT manages the GOES-R Spacecraft Parameter Database. The technology is a Web-based application for creating and maintaining spacecraft files required for setting flight software parameters associated with test and operations. PDBT controls the format of the files, the content of the files, and configuration management of the files relative to both the flight software (FSW) build cycle and the spacecraft test and operation phases.
U.S. Government Purpose Release

SpaceWire Link and Switch GSC-14734-1

NASA's Goddard Space Flight Center has developed a unique SpaceWire link-and-switch implementation. The design enables high- and low-rate communication between avionics over a network architecture. This significant advancement helps reduce the complexity of communication over satellite architecture applications and other space-flight systems while improving speed and reliability.
U.S. Release Only

SpaceWire PCI Card Windows Driver Software GSC-15173-1

This software allows the SpaceWire PCI card to be integrated into a Microsoft Windows operating environment. The PCI card supports the SpaceWire protocol and connects to spacecraft instruments and subsystems designed with SpaceWire interfaces.
U.S. Government Purpose Release

SpaceWire Reliable Data Delivery Protocol (RDDP) Software GSC-15402-1

The RDDP software provides virtual channelization, reliable data delivery, and fire-and-forget functions on a single SpaceWire link. The technology runs in a microcontroller used in Power PC single-board flight computers.
U.S. Government Purpose Release

StatusMon—Space Shuttle Main Engine (SSME)
Status Monitor and Failure ID (FID) Decoder MFS-32410-1

StatusMon reads a network data stream in real time, monitoring engine status parameters for changes.
U.S. Release Only

Swift Burst Alert Telescope (BAT) Engineering Flight Software GSC-15242-1

The BAT engineering software controls and coordinates all aspects of the instrument's operation in nominal and anomalous conditions. It distributes commands to, and collects data from, all instrument subsystems, including the power system, the 16 detector blocks, the digital signal processor, and the science data processing software. The technology also communicates with the Swift spacecraft to receive commands from the ground and send all instrument telemetry data. In addition, the software monitors the health of various instrument subsystems and takes corrective actions when necessary.
U.S. Government Purpose Release

Systems and Methods for Determining Spacecraft Orientation GSC-14666-1

This technology provides a method for determining spacecraft attitude based upon observed star locations. The software incorporates a priori spacecraft attitude files, a star catalog, a desired time interval for data, desired maximum magnitude for catalogued stars and observed stars with time tags, and associated vector coordinates and magnitudes.
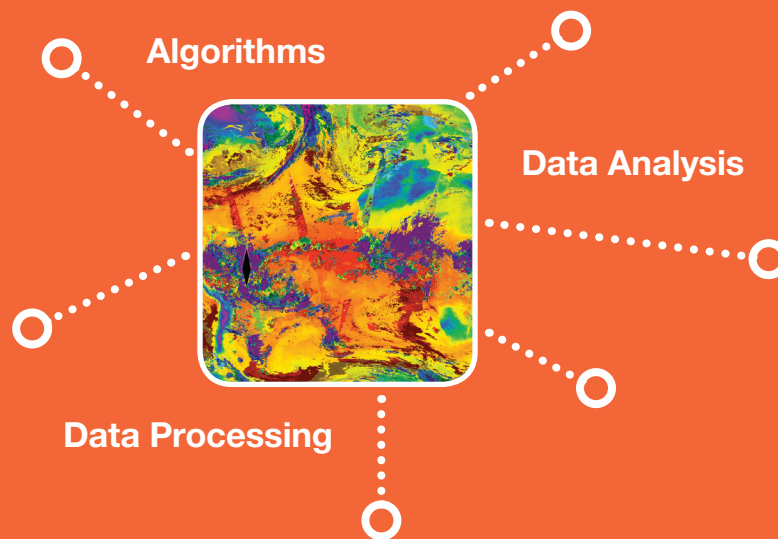**U.S. Government Purpose Release**

Wilkinson Microwave Anisotropy Probe (WMAP)
Command and Data Handling Flight Software GSC-14964-1

Functioning as the sole interface between MAP spacecraft/instrument subsystems and ground operations equipment, this technology provides a command decoding and distribution system, a telemetry/data handling system, and a data storage and playback system. It also performs the onboard processing of attitude sensor data and generates commands for the attitude control actuators in a closed-loop fashion.
U.S. Government Purpose Release

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Data and Image Processing

Algorithms

Data Analysis

Data Processing

3D Solid Models of Scientific Data for Education and Outreach   GSC-14897-1

Converting 3D topographical data into a format suitable for rapid prototyping, this technology has been used to construct models of the Martian topography with data from the Mars Orbiter Laser Altimeter (MOLA).
U.S. Government Purpose Release

3DGRAPE/AL, Version 2   LAR-16415-1

Offering increased fidelity over other packages available in the public domain and sold by private companies, 3DGRAPE/AL (3D Grids about Anything by Poisson Equations with Upgrades from Ames and Langley) provides the latest state-of-the-art software to generate structured volume grids for computational fluid dynamics (CFD) analyses. Aerospace uses include analysis of aircraft and spacecraft in fluid flight regimes.
U.S. Release Only

Advanced Photon Counting System (APCS)   GSC-14880-1

The APCS card is a complete highly integrated photon counting system.
U.S. Government Purpose Release

ARAJ Low-Density Parity Check (LDPC) Codes   JPL-43949

This software provides a construction method for protograph-based Low Density Parity Check (LDPC) codes that simultaneously achieve low iterative decoding thresholds and linear minimum distance. The technology can be used for various code rates. Proposed codes may have either fixed input block or fixed output block sizing. Both cases provide rate compatibility. In fact, one encoder and one decoder can support different code rates.
U.S. Government Purpose Release

Augmentation of Virtual Space Physics Observatory Services to Expand Data Access Capabilities   GSC-14924-1

This technology is a combination of three features/capabilities: (1) process and computer programs to perform ad-hoc queries based on interactive mathematical analysis of time series data stored in distributed, heterogenous, digital data archives; (2) new computer programs and improvements to existing computer programs to provide integrated data discovery, data retrieval, and display of time series data stored in distributed, heterogenous, digital data archives; and (3) improvements to, and new applications of, the Xerlin XML Modeling Tool to provide metadata creation and metadata repository management capabilities for the Virtual Space Physics Observatory.
U.S. Government Purpose Release

AutoBayes: Automatic Design of Customized Analysis Algorithms and Programs   ARC-16276-1

AutoBayes uses extended Bayesian networks, a powerful symbolic system, and algorithm schemas to automatically generate efficient and customized programs for data analysis. It generates a standardized design document containing a graphical representation of the Bayesian network and of the details regarding the code's generation. Please visit the following URL for additional information: <http://ti.arc.nasa.gov/opensource/projects/autobayes>
Open Source

AutoFilter: Automatic Generation of Customized State Estimation Code with Kalman Filters   ARC-16297-1

AutoFilter is a software tool that automatically generates efficient and customized code for navigation and state estimation using Kalman filter algorithms. The input for the tool is a detailed, high-level description of the problem's process, noise, and measurement models as well as software interface descriptions and architectural details. Using its powerful symbolic system and algorithms schemas, AutoFilter symbolically calculates all required matrices and produces code tailored toward the specific problem.
U.S. Government Purpose Release

Automated IR Image Damage Detection Algorithm with Quantitative Error Threshold — GSC-15170-1

This innovation uses IR images of samples with conductive heat gradients to perform qualitative damage detection within a given error budget.
U.S. Release Only

AutoPost — MFS-32925-1

AutoPost can process any configuration of test data as needed. The tool can combine a series of data parameters into a single parameter.
U.S. Release Only

C Global Surveyor (CGS) — ARC-15389-1

CGS is a static analyzer using abstract interpretation techniques to analyze C programs. CGS covers all execution paths and all data accesses and checks every program operation for potential errors (e.g., out-of-bound array accesses).
U.S. and Foreign Release

CertWare Safety Case Workbench Software — LAR-18067-1

This technology contributes several core modules to support safety case models and offers a service-based application programming interface that enables new model-processing capabilities to be plugged into the workbench.
Open Source

Chimera Grid Tools, Version 2.1 — ARC-16025-1A

The Chimera Grid Tools software package contains a collection of software tools for performing geometry processing, surface and volume grid generation, grid manipulation and diagnostics, flow solver input preparation, multi-body dynamics input preparation and animation, flow solution visualization, debris trajectory analysis input preparation, strand grid and AMR Cartesian grid visualization, flow solution post-processing analysis including forces and moments computation, and convergence history visualization. Please visit the following URL for additional information: <http://people.nas.nasa.gov/~wchan/home.html>
U.S. Release Only

Code for Finding the Argmin and Argmax of a Data Variable in Stata Statistical Software — MSC-25718-1

This technology is used to find the argmin and argmax of a data variable within a Stata data set. The argmin and argmax in this case are the observation numbers at which the data variable achieves its minimum and maximum values (rather than the values themselves). Besides calculating and returning the argmin and argmax (i.e., observation number), the code returns the minimum and maximum values for reference, and, upon request, returns the values of other data variables at the same observation numbers.
U.S. Government Purpose Release

Code for Finding the Running Maximum, Minimum, and Range of a Data Variable in Stata Statistical Software — MSC-25722-1

This technology is used to create a data variable that contains the running maximum, minimum, and range (maximum minus minimum) of another variable in a Stata data set. The code can also conceptually divide a data set according to values of other variables and calculate the running maximum, minimum, or range separately within each division.
U.S. Government Purpose Release

Configurable Real-Time Analysis System (CRANS) Software Program, Version 7   MSC-25673-1

CRANS provides status of an avionics system utilizing an expert system for standard failure and correction options for potential failures. The program provides a means of representing logically interconnected items in a matrix format.

U.S. Government Purpose Release

Constellation PRACA Extension of the Bugzilla Application   ARC-16033-1

The Constellation PRACA I-1 system is a modified version of an open-source, Web-based defect tracking tool called Bugzilla. Bugzilla allows software developers to document and track outstanding bugs in their products; in the Constellation PRACA I-1 system, these core capabilities have been extended to provide the necessary functionality and usability defined in the PRACA processing requirements.

Open Source

Core Hierarchical Segmentation (HSEG) Software Package   GSC-15855-1

This version of HSEG is not subject to patent restrictions. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/HSEG/>

Open Source

Data Compression for Time-Series and Spectral Data   GSC-14820-1

This general-purpose data compression algorithm has been developed using Chebyshev polynomials to preserve the necessary information for quantitative scientific analysis. The algorithm is computationally simple yet provides compression factors much greater than two. The method is suitable for the compression of science data (e.g., spectral data, particle or photon count rate data, and magnetometer data) from many types of space instruments.

U.S. Government Purpose Release

D-Dimensional Formulation and Implementation of Recursive Hierarchical Segmentation (RHSEG)   GSC-15199-1

This RHSEG algorithm provides the implementation for one, two and three spatial dimensions.

General Public Release

Decomposition of Higher Order Transfer Functions (TFNS) Into a Sum or Product of Lower Order Transfer Functions   GSC-14868-1

This program decomposes higher order transfer functions into a sum or product of lower order transfer functions (first, second, or third order) that can be implemented directly by a single operational amplifier in standard configurations such as the modified Sallen-Key or Chebychev. (MATLAB, one of the most versatile computer-aided analysis and design tools for control and signal processing, does not possess this capability.) Decompositions are not done arbitrarily since the poles of transfer functions, in general, exist as complex pairs.

U.S. Government Purpose Release

Digital Elevation Model Maker (DEMmaker)   MSC-24722-1

This software suite produces data products containing surface shape, reflectivity, and geomorphology for a desired planetary surface. The technology produces seamless sets of digital elevation models (DEMs) at virtually any resolution or size to provide the desired levels of terrain feature detail as a spacecraft approaches a planetary surface. The innovation enables researchers to study a wide variety of problem domains, as the DEMs incorporate observed data as well as mathematical models of planet morphology.

U.S. Government Purpose Release

Direct Solve Image-Based Wavefront Sensing
GSC-15208-1

This technology solves for the wavefront directly from a single image and does not require defocusing or a nonlinear iterative algorithm.
U.S. Government Purpose Release

DthData Armstrong Time-History Software Utility
DRC-012-024

A standalone command-line-driven utility program, DthData processes time-history format data files generated by the Armstrong Core Simulation Software.
U.S. Release Only

DthDiff Armstrong Time-History Difference Software Utility
DRC-012-025

A standalone command-line-driven utility program, DthDiff is used to compare two Armstrong time-history format data files generated by the Armstrong Core Simulation Software.
U.S. Release Only

Elimination of Parameter Input Requirement for Elliptic Grid Generation Methods in Engineering
ARC-14710-1

This software implements an enhanced method of elliptic grid generation.
U.S. Government Purpose Release

Empirical Mode Decomposition Method and Hilbert Spectral Analysis Algorithms
GSC-13817-1

This software enables computer-implemented physical signal analysis and associated presentation techniques of results. It uses an empirical mode decomposition to extract a collection of intrinsic mode functions (IMFs) from nonlinear, nonstationary physical signals. IMFs can be used to calculate instantaneous frequencies. This software can localize any event on a time and frequency axis.
U.S. Government Purpose Release

Enhanced Graphics for Extended Scale Range
GSC-14819-1

Conventional computer graphics algorithms exhibit anomalies when rendering scenes containing simultaneously displayed objects differing enormously in scale and distance from the viewer. The Extended Scale Range software employs a dynamic repartitioning of the distance scales of scene objects during rendering to eliminate almost all such problems in a way compatible with implementation in software, in vertex and pixel shaders, and in hardware accelerators.
U.S. Government Purpose Release

Estimated Spectrum Adaptive Postfilter (ESAP) and the Iterative Prepost Filtering (IPF) Algorithms
GSC-14213-1

These algorithms provide new frequency-based, pixel-adaptive filtering for low-bit-rate JPEG-format images and MPEG-format video. The Estimated Spectrum Adaptive Postfilter (ESAP) and the Iterative Prepost Filtering (IPF) algorithms significantly reduce the blocking artifacts resulting from high compression by reusing the discrete cosine transform coefficient local frequency characteristics to control a pixel-adaptive nonlinear post-filter (or "pre-post") filtering system.
U.S. Release Only

Ethernet-to-HRDL Conversion Design
GSC-16513-1

The International Space Station (ISS) uses a fiber-optic High Rate Data Link (HRDL) standard for transferring data. Those designing ISS experiments, however, may prefer an Ethernet interface. This design allows ISS instruments to keep their Ethernet interface by converting the Ethernet data format into a format compatible with the ISS.
U.S. Government Purpose Release

Fault-Tolerant Digital Signal Processing (DSP) GSC-15050-1

This software combines the popular Internet Protocol (IP) with high-speed switching fabrics to create a hardware-independent routing environment for software radio. The flexible routing provided by this network layer allows signal streams to be dynamically routed (and rerouted) between computational elements, allowing software radio designers to build flexible and fault-tolerant signal processing chains for many applications and hardware implementations. Conventional IP implementations cannot meet the performance requirements of software radio data streams. The innovation in this research stems from the unique combination of software radio development requirements, advances in network and transport layer designs to support high-speed switching fabrics, and the inherent capabilities provided by IP.

U.S. Government Purpose Release

FFTW-Based Symmetric Transforms GSC-14712-1

This software implements 1D and 2D symmetric transforms (sine, cosine, quarter-wave sine, and cosine) using FFTW.

U.S. Government Purpose Release

FilePlottingTools LAR-18314-1

This Excel plugin written in VB.net allows rapid post-processing of thermal analysis data from text files or from SINDA-formatted SAV files. The software can be adapted to other data formats as well.

Open Source

Finite Element Computer Code for the Analysis of Composite Shell Structures GSC-14756-1

Used to predict the deformation of thin aerospace structures made of isotropic or fiber-reinforced composite materials, this technology utilizes the finite element method (a numerical technique) as part of the formulation.

U.S. Government Purpose Release

Flow Solver for Incompressible 2D-Driven Cavity GSC-15107-1

This software solves the Navier-Strokes equations for the incompressible 2D-driven cavity flow problem. The code uses second-order finite differencing on a staggered grid. The equations are solved using the Chorin projection method, and the resulting intermediate Poisson equation is efficiently solved using the fast Fourier transform. Time-stepping is done using fourth-order Runge Kutta for stability at high Reynolds numbers. Features include check-pointing, periodic field snapshots, ongoing reporting of kinetic energy and changes between time steps, time histories at selected points, and optional streakline generation.

U.S. Government Purpose Release

Flow Solver for Incompressible 2D Rectangular Domains GSC-15111-1

This software solves the Navier-Strokes equations for the incompressible flow utilizing finite differencing on a uniform staggered grid. The domain must be rectangular, but it may have a rectangular walled region within the domain. The technology can solve a large variety of classical fluid flow problems: L-shaped cavity, channel flow, or wake flow past a square cylinder, etc. The code uses fourth-order Runge Kutta time-stepping and overall second-order spatial accuracy.

U.S. Government Purpose Release

Further Refinement of the Computationally Efficient Hierarchical Segmentation (HSEG) Algorithm GSC-16250-1

This innovation is a further refinement of the computationally efficient version of the HSEG algorithm. Version 1.51 allows the number of large regions to exceed spclust_max to keep the number of large regions greater than a fixed minimum value equal to spclust_min.

U.S. Government Purpose Release

Gamma-Ray Large Area Space Telescope (GLAST) Anti-Coincident Detector (ACD) Electronic Ground System Equipment (EGSE) Software GSC-14802-1

GLAST ACD EGSE is a suite of graphical user interface applications and test scripts built on a software framework provided by the GLAST LAT project at the Standford University Linear Accelerator Center (SLAC). It was developed to configure, control, and test ACD hardware during integration and test operations.
U.S. Government Purpose Release

Geo-Correction for Airborne Platforms (GCAP), Version 1.0 GSC-16786-1

The GCAP software was developed to provide the user with the ability to geo-reference a raster image using the Inertial Measurement Unit data. The output image is then further processed by other software functions to generate higher-level data products such as flood, fire, water, and oil classifications.
U.S. Government Purpose Release

Geometry Manipulation Protocol (GMP) for Computational Fluid Dynamics (CFD) Applications, Version 1.0 ARC-15690-1

GMP serializes datatypes between XML and ANSI C data structures to support CFD applications. The library currently provides a description of geometric configurations, general moving-body scenarios (prescribed and/or 6-DOF), and control surface settings. GMP is available at: <http://ti.arc.nasa.gov/opensource/projects/gmp/>
Open Source

Global Assimilative Ionosphere Model (GAIM) JPL-40584

GAIM is used to estimate the three-dimensional electron density distribution of the Earth's ionosphere as a function of time. To achieve high accuracy for users, the software accepts a wide variety of ionospheric measurements as input and produces output either in real time or in post-processing. The software can also generate predictions of the electron density structure for several hours or days into the future.
U.S. and Foreign Release

GPS Occultation Analysis System (GOAS) JPL-30596

GOAS processes atmospheric and ionospheric occultation data obtained from low-Earth-orbiting global positioning systems transmission receivers. The technology obtains input from a variety of receiver types and satellites and outputs full atmospheric and ionospheric retrievals.
U.S. and Foreign Release

Ground and Space Radar Volume Matching and Comparison Software GSC-15738-1

This software enables easy comparison of ground- and space-based radar observations for validation purposes. It can be accessed at: <http://opensource.gsfc.nasa.gov/projects/GSRadar/>
Open Source

Growler ARC-15690-1

Growler is a component-oriented framework aimed at distributed and collaborative visualization and computational steering. The technology's distributed object and event architecture is suitable for application to high-performance local area network (LAN) environments as well the Internet. Its features include strong integration with C++, selective distributed reference counting, and efficient well-typed event channels for local as well as remote event broadcast. Growler can be downloaded at: <http://people.nas.nasa.gov/~bgreen/growler/>
Open Source

Hierarchical Data Format-Earth Observing System (HDF-EOS) to NetCDF Converter   GSC-15007-1

This C-language computer program accepts a set of scientific data/metadata from an Earth Observing System (EOS) satellite and converts it from the format in which it was created and delivered into another format for data processing and exchange on Earth. The converter can be downloaded at: <http://www.hdfeos.org/software/convert_hdfeos5.php>
Open Source

Highly Scalable Matching Pursuit Signal Decomposition Algorithm (MPD)   ARC-16345-1

MPD is a powerful and effective iterative algorithm for signal decomposition and feature extraction. The technology decomposes any signal into linear combinations of its dictionary elements, or "atoms." MPD can be downloaded at: <https://c3.nasa.gov/dashlink/resources/125/>
Open Source

HiMAP: Portable 3-Level Super-Modular Parallel High-Fidelity Multidisciplinary Analysis Process   ARC-14504-1

HiMAP solves static and dynamic problems by tightly coupling the Euler/Navier-Stokes flow solutions with modal/finite-element structural solutions using built-in moving grids.
U.S. Government Purpose Release

Hypatheon—Searchable Database Capability for Formalized Mathematics   LAR-18232-1

The Hypatheon suite of software tools provide a searchable database capability for the specialized domain of formalized mathematics. The technology is designed to be a companion to a specific tool called PVS, which supports an emerging type of advanced software verification intended for safety-critical systems. Hypatheon aims to enhance PVS users' productivity by first indexing the mathematical theories rendered in the PVS specification language, then making their contents searchable by an interactive software tool.
Open Source

Image-Adapted Visually Weighted Quantization Matrices for Digital Image Compression (DCTune)   ARC-12015-1

This image compression software eliminates redundant and invisible image components using a discrete cosine transform (DCT). Each DCT coefficient is used to determine the perceived image quality and the bit rate of the image being compressed.
U.S. Government Purpose Release

Image-Based Wavefront Sensing for Space Optics Control   GSC-15121-1

This test bed incorporated a phase-retrieval camera coupled to a three-mirror Vertex (3MV) test bed at Goddard Space Flight Center. Presented actuator calibration, supercomputing architectures for image-based wavefront sensing, and timing results are based on various algorithm implementations using a cluster of 64 TigerShare TS101 digital signal processors.
U.S. Government Purpose Release

Image Processing Software Environment (QuIP)   ARC-16295-1

The QuIP interpreter, a software environment for QUick image processing, uses an interactive scripting language designed to facilitate use by non-expert users through features such as context-sensitive automatic response completion. The package includes a number of script packages that implement high-, medium-, and low-level functions (e.g., analysis of eye images for human gaze tracking, feature tracking, and image filtering). The environment also includes facilities for displaying images on screen, drawing and overlaying graphics, and constructing graphical user interfaces using the scripting language. QuIP can be downloaded at: <http://opensource.arc.nasa.gov/>
Open Source

Implementation of the Proper Orthogonal Decomposition of a Multivariate Time Series GSC-15103-1

This software ingests a time series of data fields and derives the temporal and spatial eigenfunctions. These temporal eigenfunctions can then be used to form a linear combination of the data fields equal to the spatial eigenfunctions. The code is written so that the number of data fields is not an issue.
U.S. Government Purpose Release

Inductive Monitoring System (IMS), Version 5: System Health Monitoring Software That Learns System Behavior from Data ARC-15058-1A

IMS software utilizes techniques from the fields of model-based reasoning, machine learning, and data mining to build system monitoring knowledge bases from archived or simulated sensor data. The technology automatically analyzes the nominal system data to form general classes of expected system sensor values; these classes are used to build a monitoring knowledge base. When monitoring a system, IMS simply checks to see how well the incoming sensor data fit into the classes derived from the training data.
U.S. Government Purpose Release

Inference Kernel for Open Static (IKOS) Analyzers: A High-Performance Static Analysis Engine to Build Automated Code Analysis Tools for the Formal Verification of Critical Software Properties ARC-16789-1

IKOS is a kernel for the construction of open-static analyzers based on Patrick Cousot and Radhia Cousot's theory of abstract interpretation, which states that computations can be abstracted and reduced to a generalized set of objects and still exhibit the same critical properties of the parent program. By reducing the set of objects through abstraction, IKOS is scalable to large complex computer programs and presents a sound approach to verification of such programs. IKOS can be downloaded at: <http://ti.arc.nasa.gov/opensource/ikos/>
Open Source

Information Sharing Protocol Advanced Tool of Math (ISPATOM), Version 02.03.07 MSC-25714-1

ISPATOM is a generic computational software program (comps). Most comps that are run in the NASA Mission Control Center (MCC) must be defined and hard-coded into C or some other programming language. ISPATOM runs on the MCC Linux workstations and can run any computations that can be represented as a mathematical equation without prior configuration. An equation or several equations are simply entered on the command line, the values are calculated, the computed values are saved in output symbols, and the output symbols are published.
U.S. Government Purpose Release

Innovative Utilization of the Heap Data Structure for Efficient Determination of Best Merges for Hierarchical Segmentation GSC-14995-1

Recursive hierarchical segmentation (and HSEG by its inclusion in RHSEG) has wide-ranging space, Earth, and medical-science applications. In this technological improvement, the computational efficiency of RHSEG and HSEG is increased by as much as two and a half times for large images (7,000 by 7000 pixels) processed on a parallel computing system.
U.S. Government Purpose Release

Integrated Trending and Plotting System (ITPS), Release 3.0 GSC-16052-1

ITPS was enhanced to provide a more flexible network interface to support the publish, subscribe, and messaging interface of Goddard Mission Services Evolution Center (GMSEC) middleware. This capability allows for plug-and-play and loosely coupled interfaces between the trending system and the other components/systems in the Mars Orbiter Camera (MOC) environment.
U.S. Government Purpose Release

Integrated Trending and Plotting System (ITPS), Release 6.0 — GSC-16169-1

Release 6.0 of ITPS was developed to provide the Fermi mission with an improved ability to handle multiple long-term trending jobs without adjusting the time range and reselecting all the options. This release also provides more flexibility in the use of input definition files (IDFs). IDFs are used in the generation of ITPS trending products and contain selected mnemonics, filtering information, and output formats.
U.S. Government Purpose Release

IsoClus Program in C++ — GSC-14692-1

The IsoClus algorithm is a data clustering procedure used for the classification of data, frequently for the purpose of image processing.
U.S. Government Purpose Release

Iterative Transform Phase Retrieval Utilizing Adaptive Diversity — GSC-14879-1

This software is a comprehensive suite of wavefront sensing and optical control tools designed to measure the wavefront and control the optical systems in order to correct for distortion. It combines phase retrieval and phase diversity algorithms with a variety of control strategies. The software can perform these operations for filled aperture telescopes, segmented aperture telescopes, sparse aperture telescopes, and interferometric systems.
U.S. Government Purpose Release

Java Pathfinder (JPF), Version 2.0 — ARC-15388-1

Java Pathfinder (JPF) is a model checker for Java. The technology takes a Java program and "executes" it in a way that explores all possible executions/interleavings of the threads in the program. This allows JPF to detect certain bugs (e.g., deadlocks and assertion violations) that may be missed during testing. The technology can be downloaded at: <http://babelfish.arc.nasa.gov/trac/jpf/>
Open Source

Java Program to Promote an Open-Source "E Standard" for Mass Properties Engineering — LAR-17635-1

This open-source Java software helps develop electronic standards (E-Standards) for mass properties engineering. An E-Standard is a highly descriptive dataset that includes standardizing functions for data manipulation, interrogation, and formatting. With this tool, any number of users can interface with the proposed E-Standard datasets and still seamlessly utilize their own software methods.
Open Source

Java-Based Software Tool for Dynamic Aerospace Vehicle Exchange Markup Files — LAR-17460-1

An update to software originally named DAVEtools 0.5, this software-based technology is used for manipulating standard Dynamic Aerospace Vehicle Exchange Markup Language (DAVE-ML) models. The improved technology embeds the necessary initialization data into a data structure to keep the MATLAB workspace uncluttered and creates Simulink models from a generated MATLAB script.
Open Source

Knowledge Discovery and Data Mining Based on Hierarchical Segmentation of Image Data and on Visual Grammar — GSC-14696-1

This project enhances the VisiMine system by incorporating hierarchical segmentations from the Hierarchical Segmentation (HSEG) algorithm into the VisiMine system. HSEG is an approach for producing high-quality, hierarchically related image segmentations. The VisiMine image information mining system utilizes clustering and segmentation algorithms for reducing visual information in multi-spectral images to a manageable size. The features and the trainable spatial relationship model developed allow accurate classification and effective retrieval of different scenes and land cover.
U.S. Government Purpose Release

Kodiak: A Software Library for Verifying Nonlinear Arithmetic Statements — LAR-18268-1

Kodiak is a software implementation of an algorithm for verifying expressions involving nonlinear real arithmetic. It includes an optimizer for nonlinear real functions, a solver for nonlinear inequalities, and an application programming interface (API) for integrating other software verification tools.
Open Source

Libibvpp — ARC-16075-1

Libibvpp is a C++ wrapper around libibverbs, which is part of the OpenFabrics software suite. Libibvpp can be downloaded at: <http://ti.arc.nasa.gov/opensource/projects/libibvpp/>
Open Source

Library Suite Speeds Development of Kalman Filter Design — MSC-23704-1

The Generic Kalman Filter (GKF) provides all the functionality of a Kalman filter, including state and variance/co-variance matrix propagation and measurement updating, while allowing a user to define subroutines for particular problems. The innovation uses a library of trusted subroutines to handle the mundane functions that are common to all Kalman filters. This generic quality allows for flexibility and fast start-up speed for the creation of a new filter.
U.S. Release Only

Lossless Hyper-/Multi-Spectral Data Compression Software — GSC-15992-1

This software performs lossless hyper-spectral and multi-spectral data compression. It can be downloaded at: <http://opensource.gsfc.nasa.gov/projects/LHD/>
Open Source

Low-Density Parity Check Fault-Programmable Gate Array (FPGA) Decoder for the (8176,7154) Code Specified in the Consultative Committee for Space Data Systems (CCSDS) Orange Book 131.1-O-2 — GSC-15454-1

VHDL code has been written to implement the (8176,7154) LDPC code in the CCSDS Orange Book 131.1-O-2. The design has been tested using a Virtex 4 LX200 FGPA running at 66 MHz for various signal-to-noise ratios with on-chip random normal generators. The decoder core will run at 100 MHz giving a sustained throughput of 650 Mbits/second. The decoder uses the minimum sum algorithm with an attenuation multiplier of 0.75 and 6-bit saturating arithmetic. The decoder does 14 iterations per block and generates a dot product for the last iteration. Data is input and output as 7-bit probabilities of 6 bits each per cycle.
U.S. Government Purpose Release

Mariana: Text Classification System — ARC-16070-1

Mariana is an algorithm that efficiently optimizes the hyperparameters for support vector machines for regression and classification. It currently uses simulated annealing for optimization but can be extended to use a variety of stochastic optimization techniques, including Markov Chain Monte Carlo, Sequential Monte Carlo, and genetic algorithms. The software is available at: <http://ti.arc.nasa.gov/opensource/projects/mariana/>
Open Source

MATLAB Automated Test Tool (MATT) — GSC-14861-1

MATT is an application that provides an enhanced test-generation capability to users of Simulink and Real-Time Workshop. The ability to rapidly create custom test data for model simulations/executables is an important time saver that frees a user from having to develop a variety of testing input data.
U.S. Government Purpose Release

MATLAB-Code V Toolkit　　　　　　　　　　　　　　　　　　　　　GSC-15140-1

This toolkit is a set of MATLAB scripts and functions that enable rapid transfer of optical system and performance data from Code V optical software into the MATLAB environment. Typical applications include: extracting prescription data into MATLAB to confirm consistency of various delivered models; perturbing the models and performing various analyses such as ray tracing or generation of point-spread functions in support of integrated modeling activities; and enabling a MATLAB-driven optical model for integrated system-level modeling of wavefront sensing and control. The toolkit can be downloaded at: <http://opensource.gsfc.nasa.gov/projects/Matlab_Code_V/index.php>
Open Source

MATLAB-Oslo Toolkit　　　　　　　　　　　　　　　　　　　　　　GSC-15138-1

This toolkit is a set of MATLAB scripts and functions that enable rapid transfer of optical system and performance data from Oslo optical software into the MATLAB environment. Typical applications include: extracting prescription data into MATLAB to confirm consistency of various delivered models; perturbing the models and performing various analyses in support of integrated modeling activities; and enabling a MATLAB-driven optical model for integrated system-level modeling of wavefront sensing and control. The toolkit can be downloaded at <http://opensource.gsfc.nasa.gov/projects/Matlab/index.php>
Open Source

MATLAB-Zemax Toolkit　　　　　　　　　　　　　　　　　　　　　GSC-15151-1

The MATLAB-Zemax toolkit is a set of MATLAB scripts and functions that enable rapid transfer of optical system and performance data from Zemax optical software into the MATLAB environment. Typical applications include: extracting prescription data into MATLAB to confirm consistency of various delivered models; perturbing the models and performing various analyses in support of integrated modeling activities; and enabling a MATLAB-driven optical model for integrated system-level modeling of wavefront sensing and control. The toolkit can be downloaded at: <http://opensource.gsfc.nasa.gov/projects/Matlab_Zemax/index.php>
Open Source

Memory-Efficient Serial Implementation of Recursive Hierarchical Segmentation　　GSC-15198-1

This new sequential implementation of the recursive hierarchical segmentation (RHSEG) algorithm significantly decreases the algorithm's processing time requirements due to reduced disk swapping during the execution of the program. The technology also makes it possible to process very large images with the sequential implementation of RHSEG, which in previous versions of RHSEG could cause computer systems to crash by exceeding RAM and swap memory resources.
U.S. Government Purpose Release

Method for Recursive Hierarchical Segmentation by Region Growing and Spectral Clustering with a Natural Convergence Criterion　　GSC-14328-1

This hierarchical segmentation algorithm (HSEG) is a hybrid of region growing and spectral clustering that produces a hierarchical set of image segmentations based on detected natural convergence points. This recursive, divide-and-conquer implementation of HSEG is more computationally efficient than the traditional algorithm.
U.S. Government Purpose Release

Method for Recursive Hierarchical Segmentation That Eliminates Processing Window Artifacts　　GSC-14681-1

This software performs recursive hierarchical data segmentation for large data sets. The technology's approach avoids the creation of processing window artifacts altogether, and it compares favorably to previous recursive approaches and to a non-recursive, coarse-to-fine processing approach.
U.S. Government Purpose Release

Method for Recursive Implementation of Hierarchical Segmentation

GSC-14305-1

This software provides a tool for recursive implementation of hierarchical segmentation on parallel computers. The technology achieves dramatic reductions in processing times for moderate to large data sets.

U.S. Government Purpose Release

Metric Analysis Tool (MAT)

GSC-15109-1

The Metrics Analysis Tool (MAT) performs data-mining tasks to show the correlation between software source code metrics and the defects within the source code to determine the best predictors for errors/defects. MAT was designed for software code metrics, but it is not limited to that purpose and can be applied to any type of metric with an associated effort and trigger.

U.S. Government Purpose Release

Mirador: A Fast, Minimalist Search Tool for Remote Sensing Data

GSC-15291-1

Mirador is a search tool that emphasizes speed and simplicity in searching remotely sensed Earth science data. The search execution is accelerated by initially presenting dataset results with an estimated number of hits for each dataset. The simplicity of the search form makes the tool easy to learn and use, and the speed of the searches enables an iterative form of data discovery.

U.S. Government Purpose Release

Multivariate Time Series Search Capability
to Identify Complex Patterns in Large Datasets

ARC-16452-1

This software allows the user to specify a time series over multiple variables to search within massive data-sets. The tool will return a listing of events (a time series) from the database that spans multiple variables and is within a threshold distance from the query. Experiments on numerous real aviation datasets have demonstrated the algorithm's capability to uncover potential aircraft safety events (as validated by multiple aviation safety experts and airlines). The software is hosted at: <https://c3.nasa.gov/dashlink/resources/449/> and <http://ti.arc.nasa.gov/opensource/projects/mts-search/>

Open Source

NASA App

ARC-16325-1A

The NASA App delivers near-real-time NASA content to phones and tablets. The technology features missions, images, videos, tweets, a live stream of NASA TV, and news topics. The app can be downloaded at: <http://www.nasa.gov/centers/ames/iphone>

General Public Release

NASA Vision Workbench (VW), Version 3

ARC-15761-1A

Vision Workbench (VW) is a modular, extensible computer vision framework that supports a range of tasks, including automated science and engineering analysis, large satellite image processing, and 2D/3D environment reconstruction. The framework provides a rapid C++ development environment as well as a flexible, multi-platform system to deploy computer vision applications. The module interface allows new capabilities to be rapidly integrated, and the dataflow architecture allows image-processing pipelines to be quickly developed and reconfigured. NASA Vision Workbench can be downloaded at: <https://github.com/visionworkbench/visionworkbench>

Open Source

New Data System for Laser Development, Real-Time Beam Analysis,
and Automated Testing for the Macintosh Platform

GSC-14828-1

This hardware/software package is a one-of-a-kind laser beam imaging system for the Macintosh platform, taking advantage of the UNIX kernel and 64-bit architecture. The package consists of a commercial video capture card, a digital charge-coupled device (CCD) camera, and custom drivers and software. The technology allows a laser developer or operator to image any component of a laser beam in real-time fashion.

U.S. Government Purpose Release

NIOSH 582 Method; Modification of the Method from a Microscope to a Video Terminal Display
MSC-24797-1

The NIOSH 582 fiber-counting microscopy method requires an analyst to bend over a microscope and look through a calibrated graticule in order to count fibers on a slide on the microscope stage. This software places the calibrated graticule onto a computer screen and allows the analyst to perform the same technique looking at a computer screen placed next to the microscope.
U.S. Government Purpose Release

nu-Anomica (Previously Sparse One Class Support Vector Machines (SOC-SVMs))
ARC-16346-1

nu-Anomica is an anomaly detector that can run faster than traditional OC-SVMs. The technology can handle large training sets and works with a well-defined target function. The program utilizes the OSU SVMs code (which is a MATLAB version of Lib-SVMs) as the baseline. Please visit the following URL to download the technology: <http://ti.arc.nasa.gov/opensource/projects/nu-anomica/>
Open Source

nub-NPOESS User Block Tool
GSC-15190-1

The nub-NPOESS user block all-in-one tool allows a user to manipulate an h5 user block without changing the h5 formatting (the format of most data distributed by the National Polar-Orbiting Operational Environmental Satellite System).
U.S. Government Purpose Release

ODL-to-XML Converter
GSC-15013-1

This command-line Java-based utility converts ODL Hierarchical Data Format-Earth Observing Satellite (HDFEOS) metadata file to an HDFEOS XML file. The tool utilizes an all-Java ODL library that includes a syntax and grammar parser. The software can be downloaded at: <http://opensource.gsfc.nasa.gov/projects/ODL_XML/index.php>
Open Source

On-the-Fly Reprocessing (OTFR) Subsystem
GSC-14953-1

The OTFR subsystem provides scientifically useful (level-2) Hubble Space Telescope (HST) science products from the archived HST raw (level-0) datasets on demand. OTFR operates as a collection of data processing routines that work within the context of the existing HST pipeline data flow system.
U.S. Government Purpose Release

Optical Systems Characterization and Analysis Software
GSC-14727-1

This comprehensive tool is used for filled aperture, segmented aperture, and sparse and interferometric imaging systems. The software applies to models, wavefront aberrations, misalignments, optical point-spread functions, and optics of multiple spacecraft flying in formation. Modeling options include coronagraphs, fast-steering mirrors, actuators, and deformable mirrors, among others.
U.S. Government Purpose Release

OPUS
GSC-14353-1

Originally designed by the Space Telescope Science Institute for use in the Hubble Space Telescope program, the OPUS software allows engineers to reduce data taken by the telescope and guide data through a processing pipeline that converts raw information into data useful to astronomers.
U.S. Government Purpose Release

OPUS Application Programming Interface (OAPI)/On-the-Fly Reprocessing (OTFR) Data Processing System   GSC-14739-1

Based on the OPUS design, OAPI and OTFR have significantly enhanced the quality of science data available to astronomical researchers from the Hubble Data Archive and have facilitated the use of OPUS to support data processing for other missions.
U.S. Government Purpose Release

Outlier Detection Via Estimating Clusters (ODVEC)   ARC-16467-1

The Outlier Detection Via Estimating Clusters (ODVEC) software provides an efficient method for real-time or offline analysis of multivariate sensor data for use in anomaly detection, fault detection, and system health monitoring. ODVEC uses models automatically derived from archived system data to identify unusual, out-of-family data samples (outliers) that indicate possible system failure or degradation.
U.S. Government Purpose Release

Parallel Computing Tools for the Interactive Data Language (IDL)   GSC-15048-1

The Interactive Data Language (IDL) is a standard tool used by researchers in observational fields. The increasing amounts of data produced by observatories and increasing complexity in image processing algorithms require enhanced computing power. Cluster computing is a cost-effective way to increase the speed of computation; however, IDL currently has no support for cluster computing. This software package allows researchers to take advantage of clusters from within IDL.
U.S. Government Purpose Release

Parallel Integrated Frame Synchronizer (PIFS) Chip   GSC-13813-1

This parallel integrated frame synchronizer implements a sequential pipeline process wherein serial data (in the form of telemetry data or weather satellite data) enter the synchronizer by means of a front-end subsystem and pass to a parallel correlator subsystem or a weather satellite data processing subsystem.
U.S. Government Purpose Release

PEGASUS 5: Software for Automated Pre-Processing of Overset Computational Fluid Dynamics (CFD) Grids   ARC-15117-1

PEGASUS 5 provides the hole-cutting and connectivity information between overlapping grids, and it is used as the final part of the grid-generation process for overset-grid computational fluid dynamics (CFD) approaches. This version of PEGASUS has many new features: automated hole cutting; a projection scheme for fixing small discretization errors in overset surfaces; more efficient interpolation search methods using an alternating digital tree and a stencil-jumping scheme; hole-size optimization based on additional layers of fringe points; and an automatic restart capability. The new code has also been parallelized using the Message-Passing Interface standard and can speed up execution time by up to a factor of 30 for very large problems. More information can be found at: <http://people.nas.nasa.gov/~rogers/pegasus/intro.html>
U.S. Release Only

Perilog, Version 3.0   ARC-15310-1

Perilog software capabilities include keyword-in-context search, flexible phrase search, search by example, phrase generation, and phrase extraction. The technology's keyword-in-context search feature retrieves documents that contain one or more user-specified keywords in context, ranks documents on their relevance to the keywords in context, and displays the documents with the query words highlighted and, optionally, with strongly associated words also highlighted.
U.S. Government Purpose Release

PixelLearn   JPL-42082

PixelLearn is a tool for classifying the pixels in scientific image data sets. Based on one or more images on the same grid, the tool uses cutting-edge clustering algorithms to automatically find structures in the image, or to label individual classes and use supervised classification methods to extend the labels to the rest of the image.

U.S. Government Purpose Release

PLOT3D, Version 4.1   ARC-14400-1

PLOT3D is a computer graphics program designed to visualize the grid and solutions of structured computational fluid dynamics (CFD) datasets. Version 4.1 uses the OpenGL/GLUT graphics library. Several new features have been added to the code. These include: automatic computation of grid coordinate minimum/maximum; an orphan point plotting function; the ability to read double-precision unformatted data; negative grid index processing; random specification of colors for different walls; and simultaneous specification of walls and subsets for all zones.

U.S. Release Only

Pour: A Framework for Periodic, On-Demand, and User-Specified Information Reconciliation   ARC-15468-1

Pour is a general-purpose information service framework for periodic, on-demand, and user-specified information reconciliation. The technology is designed to accommodate a wide variety of information types with support for high-volume, low-frequency periodic updates, user-specified updates, and automatic updates collected on demand when needed. Pour can be downloaded at: <http://people.nas.nasa.gov/~kolano/projects/pour.html>

Open Source

Projection to a Dynamical System for the Incompressible Navier-Stokes Equations   GSC-15105-1

This software computes the coefficients of the nonlinear dynamical system for the case of the incompressible Navier-Stokes equations.

U.S. Government Purpose Release

PseudoDiversity: Direct Wavefront Control and Image Restoration at High Bandwidth   GSC-15464-1

PseudoDiversity is an approach that simultaneously recovers (1) the wavefront feedback to actuators in an optical system or telescope system and (2) the object or extended scene under study. The technology is very useful for both astronomical and Earth-sensing imaging and spectroscopic systems, and it removes the need for complex metrology and nonlinear phase retrieval and phase diversity approaches.

U.S. Government Purpose Release

Quick Plot General-Purpose Plotting Tool   DRC-012-022

Quick Plot is a general-purpose tool used to plot Armstrong time-history data files and data files in the MATLAB format. The graphical user interface allows commands to be scripted and read from an input script file; input signals can be modified using algebraic expressions.

U.S. Release Only

Radar Software Library (RSL)   GSC-15037-1

The Radar Software Library (RSL) is a set of routines designed to facilitate the task of accessing radar data. The technology provides a consistent data structure independent of original data format; software tools for accessing components of that structure; an object-oriented approach for accessing data; and the ability to read many radar formats, including WSR-88D, UF, and SIGMET.

U.S. Government Purpose Release

Real-Time Software Receiver
GSC-14917-1

This software receiver executes on a general-purpose processor, and it includes data acquisition and correlator modules that perform baseband mixing and PRN code correlation using bitwise parallelism.
U.S. Government Purpose Release

Recursive Hierarchical Segmentation (RHSEG), Version 1.45
GSC-15898-1

The RHSEG software provides hierarchical segmentation (pre-processing) of image and image-like data.
U.S. Government Purpose Release

Refinement of the Hierarchical Segmentation (HSEG) Algorithm for Improved Computational Processing Efficiency
GSC-16024-1

In earlier versions of HSEG, all regions, irrespective of size, are involved in constrained spectral clustering. This new approach provides a method to deal with the existence of many valid small regions in an image, without forcing small regions to merge into larger regions.
U.S. Government Purpose Release

Region Labeling Tool for Use with Hierarchical Segmentation
GSC-14331-1

This tool facilitates the selection of particular hierarchical segmentations from the output of the RHSEG (Recursive Hierarchical Segmentation) algorithm. When an analyst selects a particular data point, all other data points in the same region are highlighted. The level of segmentation detail can be adjusted by selecting other levels from the segmentation hierarchy.
U.S. Government Purpose Release

Requirements Tracing On Target (RETRO)
GSC-14976-1

RETRO offers methods and techniques for information retrieval (IR), including vector retrieval and probabilistic retrieval. The technology can be downloaded at: <http://opensource.gsfc.nasa.gov/projects/RETRO/index.php>
Open Source

Semantic Metrics for Object-Oriented Design (SemMet)
GSC-14752-1

SemMet calculates semantic metrics, providing software metrics that are substantially more accurate and more human-understandable than traditional software metrics based on calculated syntactic aspects of source code.
U.S. Government Purpose Release

SequenceMiner—Anomaly Detection in Large Sets of High-Dimensional Symbol Sequences
ARC-16053-1

SequenceMiner was developed to address the problem of detecting and describing anomalies in large sets of high-dimensional symbol sequences. The technology performs unsupervised clustering (grouping) of sequences using the normalized longest common subsequence (LCS) as a similarity measure, followed by a detailed analysis of outliers to detect anomalies. SequenceMiner utilizes a new hybrid algorithm for computing the LCS that has been shown to outperform existing algorithms by a factor of five. The technology can be downloaded at: <http://ti.arc.nasa.gov/opensource/projects/sequenceminer/>
Open Source

Simple, Scalable, Script-Based Science Processing (S4P) Archive
GSC-15040-1

S4P is a disk-based data archival system for remote sensing data. The system is used for new data transfer, data preprocessing, metadata generation, and data archival.
U.S. Government Purpose Release

Soft Decision Analyzer for Performing Real-time Analysis of Radio Frequency (RF) Signals
MSC-24798-1

This package is a hardware, firmware, and software-based system that performs real-time closed-loop statistical analysis of single- or dual-channel serial digital radio frequency communications systems operating in very low signal-to-noise conditions. The innovation's closed-loop detection allows it to simulate a live system and correlate observations with frame, code word, and packet losses as well as quality-of-service and quality-of-experience events.

U.S. Government Purpose Release

Software Metrics Analysis Tool (SMAT)
GSC-15108-1

SMAT was developed in order to analyze the effectiveness of common software metrics for predicting/detecting defects in software.

U.S. Government Purpose Release

Space Habitability Observation Reporting Tool (iSHORT)
MSC-25736-1

Designed for use on the iPad 2 (or newer technology), iSHORT allows users to capture text, audio, video, and photographs within a single interface. The app allows users to indicate the priority of their observation (no change needed, nice to have, or must be addressed); provides a list of memory joggers to assist users in recalling items of interest related to human factors and habitability; and allows for simple report submission within the app.

U.S. Government Purpose Release

Space Packetized Telemetry System (SPoTS)
MSC-25183-1

The Space Packetized Telemetry System (SPoTS) is a real-time telemetry viewer. Display screens are built using a custom display builder with telemetry data fields, plot objects, data widgets, and standard objects. Measurement IDs are loaded from XTCE files.

U.S. Government Purpose Release

Spatial Standard Observer
ARC-14569-1

The Spatial Standard Observer (SSO) is a computer program for measurement and specification of the perceptual intensity of a visual image, or of the perceptual distance between two visual images. The SSO operates on a digital image or a pair of digital images. It computes a numerical measure of the perceptual strength of the single image, or of the difference between the images.

U.S. Government Purpose Release

Speaker Verification, Speaker Authentication, and Speaker-Independent Phoneme Recognition Improvements and Equivalent Image Processing
GSC-14723-1

This powerful tool offers more accurate and detailed processing of human speech by tailoring the type and duration of measurements, removing many transmission variables, and truncating non-speech noises that degrade detection processes.

U.S. Government Purpose Release

Spectral Analysis Tool (SAT), Version 6.2
JPL-43129

The SAT computer program calculates signal spectra, bandwidths, and interference effects for several families of modulation schemes found commonly in radio, satellites, and space communications. It is primarily used for spectrum management purposes to examine the effects of radio frequency interference on a satellite communication system.

U.S. Government Purpose Release

Split-Remerge Method for Eliminating Processing Window Artifacts in Recursive Hierarchical Segmentation
GSC-14994-1

This technology allows recursive hierarchical segmentation to better serve wide-ranging space, Earth, and medical science applications.
U.S. Government Purpose Release

Stata Code for Finding the "Optimal Alpha" for Several Statistical Tests
MSC-25682-1

Two main types of errors occur in statistical hypothesis testing: type I errors reject a default hypothesis when it is actually correct, and type II errors fail to reject the default hypothesis when it is incorrect. The probability of type I errors is conventionally denoted as alpha, while the probability of type II errors is conventionally denoted as beta. The NASA code developed in this effort calculates the optimal alpha in Stata statistical software for several versions of statistical hypothesis tests.
U.S. Government Purpose Release

Structural Analysis Routines (STARS)
DRC-011-003

Structural Analysis Routines (STARS) is an efficient, cost-effective, and unique computer program that analyzes a variety of practical engineering problems. The software is a fully integrated, multidisciplinary, finite-element-based, graphic-oriented analysis tool that combines individual modules to solve complex engineering problems. STARS can be used for a range of applications, including structural analysis, heat transfer, linear aerodynamics, and computational fluid dynamics (CFD) as well as coupled linear and CFD-based (aeroelastic, aeroacoustic, and aerothermoelastic) acoustics and aeroservoelastic analysis. Because of the tool's highly integrated nature, it has broad application across many engineering disciplines.
U.S. Release Only

Sun Format Database (SunAcc) File Read/Write Library
MFS-32397-1

The Sun Format Database (SunAcc) was developed to fulfill a need for local native storage of Space Shuttle Main Engine (SSME) test data. While the file format itself is native to the Sun UNIX platform, the read/write library was developed to be a cross-platform tool and is compatible with a variety of UNIX and Windows platforms.
U.S. Release Only

Surfer: An Extensible Pull-Based Framework For Resource Selection and Ranking
ARC-15295-1

Surfer examines the pool of potential grid resources and extracts the highest-ranking resources that meet user-specified constraints and preferences. The technology has been implemented as a grid service that is compliant with an Open Grid Services Infrastructure (OGSI), and it can also be embedded directly into Java applications through its application programming interface or into non-java applications through its XML-based command-line interface. Surfer can be downloaded at: <http://people.nas.nasa.gov/~kolano/projects/surfer.html>
Open Source

Swim: A Software Information Metacatalog for the Grid
ARC-15469-1

Swim is a software information service for the grid built on top of the NASA-developed Pour framework. Software information is periodically gathered from native package managers on FreeBSD, Solaris, and IRIX as well as the RPM, Perl, and Python package managers on multiple platforms. Please visit the following URL to download the technology: <http://people.nas.nasa.gov/~kolano/projects/swim.html>
Open Source

Tiled Web Map Service (WMS) Server
JPL-44685

This technology processes WMS requests that comply with a given request grid from an existing tile dataset. It also generates the KML configuration files required to access WMS tiles.
U.S. Government Purpose Release

Tolerance Domain Specific Language
LAR-17546-1

This sensitivity task employs the Monte Carlo method. Thousands of simulations are run with randomly varied input parameters, and then statistical correlations are computed to determine the sensitivity of output parameters to each input parameter.
Open Source

Tool For Interactive Plotting, Sonification, and 3D Orbit Display (TIPSOD)
GSC-14732-1

TIPSOD is a software application designed for interactive, animated, 4D (space and time) visualization of satellite orbits. The technology is implemented in Java 3D and is an extension to the existing Satellite Situation Center Web (SSCWeb) 2D static orbit graphics. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/tipsod/index.php>
Open Source

Trending and Plotting System (TAPS)
GSC-15025-1

The TAPS system is a Java/Web-based computer software application that accesses archived engineering telemetry and allows the user to plot, trend, and display spacecraft engineering data in a format that is useful for spacecraft subsystems engineers to evaluate the health and status of various subsystems.
U.S. Government Purpose Release

Using Independent Verification and Validation (IV&V) Findings to Perform Flight Software Technical Assessments
GSC-15041-1

This process recasts and overlays information onto the current methods to collect IV&V issues, essentially enabling a "normalization" of IV&V findings.
U.S. Government Purpose Release

VHDL Code For High-Rate Digital Demodulator (HRDD) Application-Specific Integrated Circuit (ASIC)
GSC-14808-1

The HRDD ASIC chip is a very large scale integrated circuit that provides demodulation and bit synchronization across a wide range of mission and telemetry formats. Formats include Binary Phase-Shift Keying (BPSK), Quadrature Phase-Shift Keying (QPSK), 16-Quadrature Amplitude Modulation (QAM), and other forms of PSK. The chip is designed to operate at rates up to 300 mega-symbols per second for BPSK and QPSK modulation and can operate at higher rates when QAM or higher orders of PSK modulation are used.
U.S. Government Purpose Release

Video Image Stabilization and Registration (VISAR)
MFS-31243-1

Video Image Stabilization and Registration (VISAR) is a software program that will stabilize video images distorted as a result of video camera motion.
U.S. Government Purpose Release

Viewpoints: Software for Visualization of Multivariate Data
ARC-16019-1

A software application that allows the interactive visualization of multivariate data using a variety of standard techniques, Viewpoints can be used with extremely large data sets. Please visit the following URL to download the technology: <http://www.assembla.com/wiki/show/viewpoints/downloads>
Open Source

Visual Environment for Remote Virtual Exploration (VERVE), Version 2
ARC-16457-1A

VERVE is a 3D visualization system that provides situational awareness, science analysis tools, and data understanding capabilities for robotics researchers and exploration science operations. The technology is highly modular and extensible and includes a 3D scene-graph database, an interactive 3D viewer, and associated graphical user interfaces to OSGI plugin-based applications. VERVE can be downloaded at: <http://sourceforge.net/projects/irg-verve>
Open Source

Visual System for Browsing, Analysis, and Retrieval of Data (ViSBARD)　　　　GSC-15744-1

ViSBARD provides a way of visualizing multiple vector and scalar quantities as measured by many spacecraft at once. The data are displayed three-dimensionally; may be displayed either as connected lines or as points; and allow the rapid determination of vector configurations, correlations between many measurements at multiple points, and global relationships. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/visbard/index.php>
Open Source

Wavefront Sensing and Optical Control Software (WSOC)　　　　GSC-14725-1

Offered in a single package, this comprehensive suite of wavefront sensing and optical control software includes a set of phase retrieval and phase diversity algorithms as well as various optical control strategies.
U.S. Government Purpose Release

WinPlot Graphical Display System　　　　MFS-31664-1

WinPlot is a powerful desktop graphical analysis tool that allows the user to generate displays of unrestrictive amounts of data. It was developed to fulfill the need for fast and easily managed graphical displays of NASA test articles and facilities. WinPlot features include seamless displays of realtime and post-test data with time and event-time synchronization of data from multiple sources.
General Public Release

XML to HDF-EOS Convertor　　　　GSC-15017-1

This software program takes an XML representation of the contents of a Hierarchical Data Format-Earth Observing System (HDF-EOS) file and recreates the file from that description. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/xml2he/index.php>
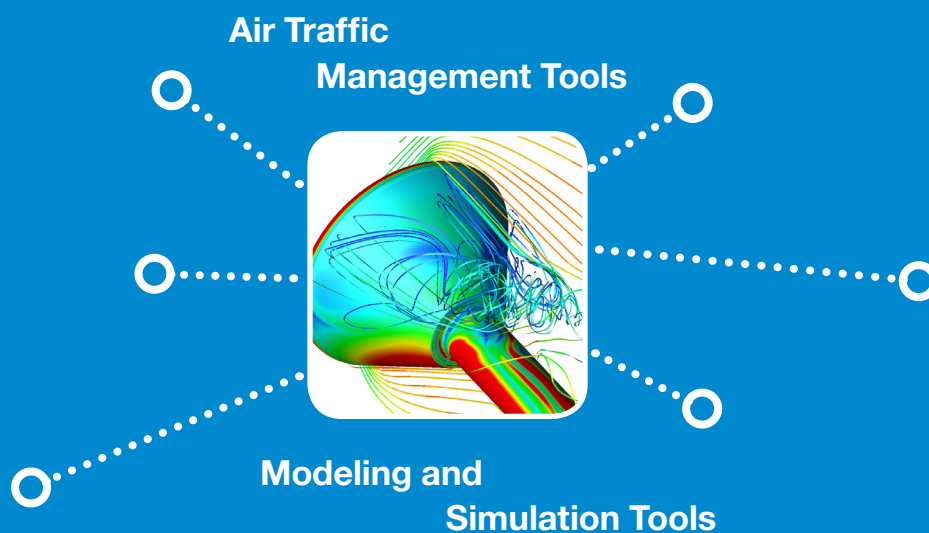**Open Source**

XML to ODL Convertor　　　　GSC-15006-1

This program translates an XML representation of Hierarchical Data Format-Earth Observing System (HDF-EOS) ODL metadata back to the ODL format. Please visit the following URL for additional information: <http://opensource.gsfc.nasa.gov/projects/xml2odl/index.php>
Open Source

15

Aeronautics

Air Traffic
Management Tools

Modeling and
Simulation Tools

Aeronautical Data Link and Radar Simulator (ADRS) ARC-15390-1

The ADRS distributed "simulation hub" allows multiple air traffic simulation components (e.g., pilot and controller operator stations and airborne and ground-based decision support tools) to be interconnected in the same simulation. The technology runs on both Windows and UNIX platforms.
U.S. Release Only

Airspace Concepts Evaluation System (ACES) ARC-15068-1

From gate departure to gate arrival, ACES is a dynamic, event-based computer simulation of aircraft operations in the National Airspace System (NAS). The technology's software-agent infrastructure provides flexibility in configuring custom simulations and enables explicit modeling of command and control entities operating within the NAS.
U.S. and Foreign Release (Academic)

Apparatus for Evaluating Software Decision Logic (ADEPT) ARC-14928-1A

The ADEPT design tool integrates a graphical user interface with an automation decision-logic application. The software generates testable prototypes for traditional usability evaluations. Exportable products can be added to the base architecture.
U.S. and Foreign Release

Application of Simplex Method to Aircraft Control Allocation Expressed as a Linear Programming Problem ARC-15285-1

This package can be used to generate actuator commands for aircraft control systems. The technology minimizes the cost function and respects actuator limitations.
U.S. Government Purpose Release

Attitude Control Software GSC-14818-1

This technology employs coarse- and fine-attitude sensor inputs to control various actuators.
U.S. Government Purpose Release

Automated Conflict Resolution for Air Traffic Control (AAC), Versions 1 and 2 ARC-15581-1A

The AAC algorithm generates resolution trajectories through a multi-step iterative process: (1) a resolution generator performs the analytical and logical functions; (2) a 4D trajectory synthesizer integrates aircraft equations of motion using detailed models of aircraft performance, operational procedures, and atmospheric conditions; and (3) a conflict detector compares trial resolution trajectories against the 4D trajectories of all other aircraft in an airspace of interest.
U.S. Government Purpose Release

Balloon Ascent—3D Simulation Tool for the Ascent and Float of High-Altitude Balloons GSC-15120-1

The user-friendly Balloon Ascent tool simulates vertical and horizontal motions of high-altitude balloons. Because formulations are generalized, the software can be used for Earth's atmosphere as well as for the atmospheres of other planets.
U.S. Release Only

Center TRACON Automation System (CTAS) ARC-15309-1

CTAS provides automation tools for planning and controlling arrival air traffic. The technology generates advisories designed to increase fuel efficiency, reduce delays, and provide automation assistance to air traffic controllers. Please visit the following URL for additional information: <http://www.aviationsystemsdivision.arc.nasa.gov/research/foundations/index.shtml>
U.S. Government Purpose Release

Cockpit Displays of Traffic Information (CDTI) Software Suite — ARC-14581-1A

CDTI consists of two main components: (1) the Pulse Predictor for Traffic Display Tool, which allows a user to compare a representation of his own expected trajectory with those of other traffic elements; and (2) the Flight-Deck-Based Flight Plan Modification Tool, which allows flight crew members to display and modify their flight plans graphically, check for predicted conflicts, and load changes into the flight management system.
U.S. Government Purpose Release

Empirical Assurance of Embedded Software Using Realistic Simulated Failure Modes — GSC-15153-1

Providing a realistic virtual system simulation of the NASA Mini-AERCam nanosatellite in its orbital environment, this technology affords sufficient fidelity for running and testing satellite-executable flight software.
U.S. Government Purpose Release

Evolutionary Mission Trajectory Generator (EMTG) — GSC-16824-1

EMTG is a global trajectory optimization tool intended for interplanetary mission design. The technology automatically searches for the optimal sequence of planetary flybys and propulsive maneuvers for maximizing payload delivery at a destination. Designed for minimal user oversight, EMTG requires only start location, destination, allowable launch-date range, allowable flight time, and minimal spacecraft hardware information.
U.S. Government Purpose Release

Future Air Traffic Management Concepts Evaluation Tool (FACET) — ARC-14653-1

FACET provides a simulation environment for evaluating novel air traffic management concepts, including air traffic control and traffic flow management. Please visit the following URL for more information about the technology: <http://www.aviationsystemsdivision.arc.nasa.gov/research/modeling/facet.shtml>
U.S. and Foreign Release (Academic)

General Helicopter (Gen Hel) UH-60A Software — ARC-15232-1

Based on a Sikorsky flight dynamics simulation, Gen Hel provides total system definition of the Black Hawk (UH-60A) helicopter. The technology offers a total force, non-linear, large-angle representation of the aircraft in six rigid-body degrees of freedom. Gen Hel has been validated extensively against static and dynamic flight data.
U.S. Release Only

Goddard Trajectory Determination System (GTDS), Release 2002 — GSC-14787-1

This technology addresses eight minor software change requests written against the 2001.01 release of the Goddard Trajectory Determination System.
U.S. Government Purpose Release

Goddard Trajectory Determination System (GTDS), Release 2008.01 — GSC-15539-1

This technology addresses minor software change requests written against the 2002 release of the Goddard Trajectory Determination System.
U.S. Government Purpose Release

Multi-Aircraft Control System (MACS) Software — ARC-14776-1

MACS increases the overall realism of human-in-the-loop air traffic control (ATC) simulations. The system accommodates multiple onsite or offsite participants (e.g., pilots, controllers, airline dispatchers, or observers) and provides simulations from either a pilot's view or a controller's view.
U.S. Government Purpose Release

Multi-Spacecraft Attitude and Trajectory Simulation (42)   GSC-14817-1

Written in ANSI C to maximize portability and customization capacity, "42" provides a simulation of the attitude and translational dynamics of multiple spacecraft that could be operating anywhere in the solar system. Attitude dynamics feature high-fidelity models of spacecraft composed of up to three connected rigid bodies, each with up to four embedded momentum wheels. Translational dynamics use Encke's method of orbit perturbation and are formulated to preserve the numerical accuracy required for precision multi-spacecraft formations.
U.S. Government Purpose Release

Navigation Accuracy Guidelines for Orbital Formation Flying   GSC-15096-1

Based on the accuracy of determining a satellite formation's semi-major axis differences, these simple guidelines could be useful in the preliminary design process and are valid for any elliptical orbit regardless of eccentricity.
U.S. Government Purpose Release

Orbit-Determination Toolbox   GSC-15728-1

Based on MATLAB and Java, the flexible Orbit-Determination Toolbox is intended primarily for the advanced mission analysis that might be performed in the concept exploration, proposal, and early design phases. Visit the following URL for more information: <http://opensource.gsfc.nasa.gov/projects/ODTBX/>
Open Source

Parallel Dantzig-Wolfe Decomposition   ARC-16432-1

This implementation of the Dantzig-Wolfe decomposition is built upon the GNU Linear Programming Kit. The technology provides a command-line tool for solving properly decomposed linear programs. Please visit the following URL to download the technology: <http://sourceforge.net/projects/dwsolver/>
Open Source

Sector 33 App   ARC-16853-1

Offering a single user interface, Sector 33 is an air traffic control simulator game for Apple and Droid mobile devices. The technology includes introductory videos, an interactive air traffic control simulation of up to five airplanes; problem scoring; and integrated solution hints. The game can be downloaded at: <http://www.nasa.gov/connect/apps.html>
General Public Release

Space Operations Learning Center (SOLC) iPhone/iPad App   GSC-16612-1

SOLC is an iPhone application for educating children about the effects of orbital debris on space missions. For more information, please visit: <http://solc.gsfc.nasa.gov>
U.S. Release Only

Spot and Runway Departure Advisor (SARDA)   ARC-16809-1

By generating departure-sequence and spot-release advisories, SARDA assists controllers with managing air traffic on an airport surface.
U.S. Government Purpose Release

Stochastic Terminal Area Scheduling Simulation (STASS)   ARC-17079-1

STASS simulates air traffic in the terminal area and ground traffic on the terminal surface. The technology uses time-based queues at various locations along an aircraft's trajectory to model traffic. For arrivals, queue locations include the freeze horizon, metering fixes, and runways. For departures, queues are positioned at airport gates, runways, and metering fixes. Flight time uncertainty is modeled using probability distributions around queue arrival times.
U.S. Government Purpose Release

StormGen Weather Editor ARC-16827-1

The StormGen interactive editor facilitates the design and production of dynamic convective weather scenarios. The software exports weather data in formats compatible with widely used air- and ground-tool simulators.
U.S. Release Only

SUPKEM ARC-16260-1

SUMKEM is fully implicit, parabolic, partial-differential equation solver that can be used for the integration of unsteady 3D turbulence kinetic energy and dissipation-rate equations. The technology enables any laminar computational fluid dynamics (CFD) solver to compute a given unsteady turbulent flow of interest.
U.S. Release Only

Surface Operations Simulator and Scheduler (SOSS) ARC-16808-1

A simulation of air traffic movement on an airport surface, SOSS can be used in developing, analyzing, and testing runway schedulers and resolution algorithms.
U.S. Government Purpose Release

Taxiway Navigation and Situation Awareness (T-NASA) System Simulation Software ARC-15246-1

The T-NASA suite is composed of a collection of computer programs and libraries that enable the real-time simulation of head-up, out-the-window, and head-down moving map displays. The technology currently runs on a distributed IRIX system using the Performer graphics libraries and the X Windows graphical user interface.
U.S. Government Purpose Release

Trajectory-Based Route Analysis and Control (TRAC) ARC-16433-1

TRAC is an extensible software platform that supports next-generation air traffic concept investigations. The software enables visualization of current-day airspace elements; graphical creation of new elements; and runway-to-runway agent-based simulation and analysis of air traffic concepts.
U.S. and Foreign Release

Trajectory-Centered Simulator (TCSim) Software ARC-15477-1

The TCSim software system was developed at Ames Research Center to support studies of trajectory-oriented air traffic management concepts. The technology simulates common commercial aircraft types, air traffic controller and pilot agents, and air traffic control automation. TCSim can be used to support concept evaluations, traffic scenario design, and automation research.
U.S. and Foreign Release (Academic)

TRAJEX Binary File Reader KSC-13564

This MATLAB function opens a binary file generated by TRAJEX, reads and parses it, and outputs a structured data array that can be used in trajectory analysis.
U.S. Government Purpose Release

Virtual Airspace Simulation Technology, Real Time (VAST-RT), Capability Two ARC-15658-1

Designed to assess advanced automation concepts and procedures being considered for the next-generation air traffic management system, VAST-RT offers real-time simulations across all air traffic control domains. Gate-to-gate simulations can involve piloted flight simulators, multiple NASA centers, TRACONS, and towers. The software's architecture links disparate legacy facilities together with simulation components developed in house.
U.S. and Foreign Release (Academic)

Vision-Based Attitude and Formation Determination System (VBAFDS) GSC-14933-1

With an integrated approach that combines a miniature star tracker with a suite of robust processing algorithms, VBAFDS provides a novel, simple, resource-efficient solution for determining navigation and topology problems. The technology is not constrained to certain Earth orbits or formation geometries.
U.S. Government Purpose Release

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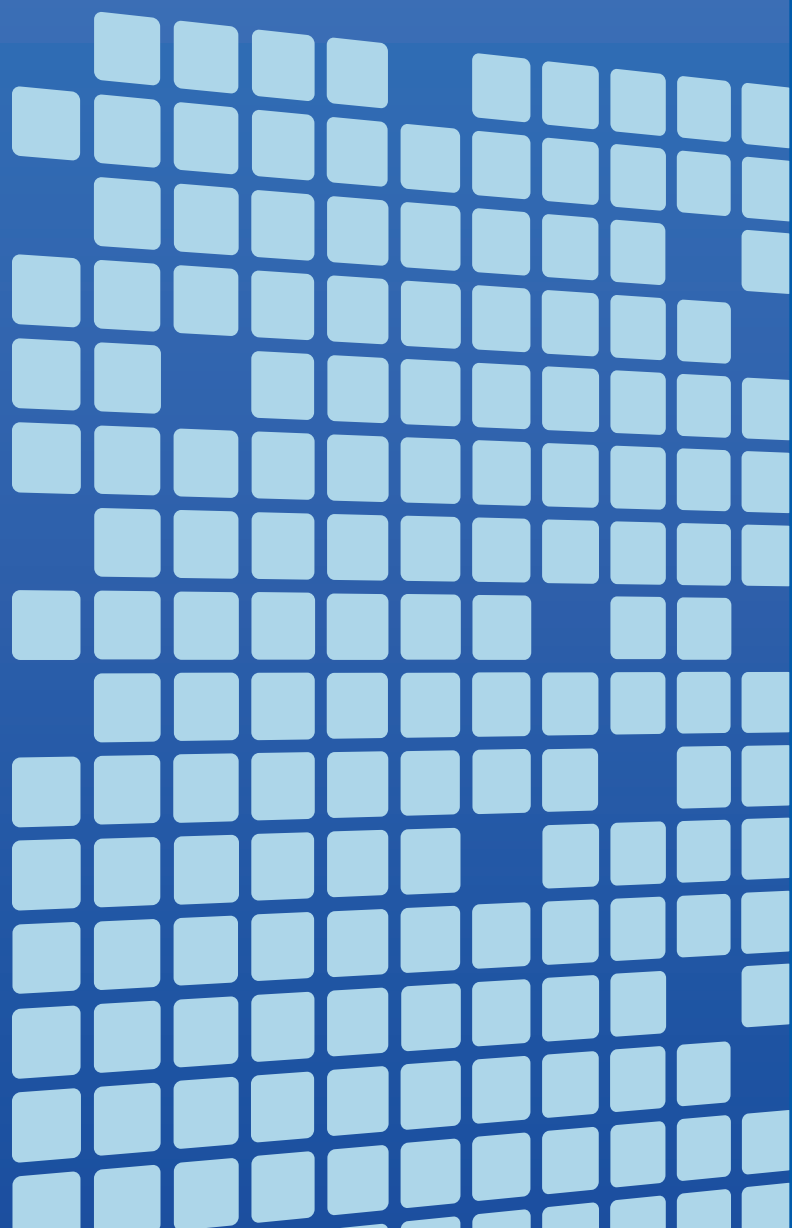
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